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Influenza Vaccination Coverage Among Health Care Personnel — United States, 2016–17 Influenza Season

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The Advisory Committee on Immunization Practices (ACIP) recommends that all health care personnel (HCP) receive an annual influenza vaccination to reduce influenza-related morbidity and mortality among HCP and their patients and to reduce absenteeism among HCP (*1–4*). To estimate influenza vaccination coverage among HCP in the United States during the 2016–17 influenza season, CDC conducted an opt-in Internet panel survey of 2,438 HCP. Overall, 78.6% of survey respondents reported receiving vaccination during the 2016–17 season, similar to reported coverage in the previous three influenza seasons (*5*). Vaccination coverage continued to be higher among HCP working in hospitals (92.3%) and lower among HCP working in ambulatory (76.1%) and long-term care (LTC) (68.0%) settings. As in previous seasons, coverage was highest among HCP who were required by their employer to be vaccinated (96.7%) and lowest among HCP working in settings where vaccination was not required, promoted, or offered on-site (45.8%). Implementing workplace strategies found to improve vaccination coverage among HCP, including vaccination requirements or active promotion of on-site vaccinations at no cost, can help ensure that HCP and patients are protected against influenza (*6*).

The Internet panel survey of HCP was conducted for CDC by Abt Associates, Inc. (Cambridge, Massachusetts) during March 28–April 19, 2017, to provide estimates of influenza vaccination coverage during the 2016–17 influenza season. Similar surveys have been conducted since the 2010–11 influenza season, and survey methodology has been described previously (*7*). HCP were recruited from two preexisting national opt-in Internet sources: Medscape, a medical website managed by WebMD Health Professional Network,* and general population Internet panels operated by Survey Sampling International (SSI).† Responses were weighted to the distribution of the U.S. population of health care personnel by occupation, age, sex, race/ethnicity, work setting, and U.S. Census region.§ Because the

*Physicians, nurse practitioners, physician assistants, nurses, dentists, pharmacists, allied health professionals, technicians, and technologists were recruited from the current membership roster of Medscape. Additional information on Medscape is available at http://www.medscape.com.

†Assistants, aides, and nonclinical personnel (e.g., administrators, clerical support workers, janitors, food service workers, and housekeepers) were recruited from general population Internet panels operated by Survey Sampling International. Additional information on Survey Sampling International and its incentives for online survey participants is available at https://www.surveysampling.com.

§Population control totals of U.S. health care personnel by occupation and work setting were obtained from the Bureau of Labor Statistics, U.S. Department of Labor, Occupational Employment Statistics, May 2015 National Industry-Specific Occupational Employment and Wage Estimates (https://www.bls.gov/oes/current/oessrci.htm). Population control totals by other demographic characteristics were obtained from the U.S. Census Bureau, Current Population Survey Monthly Labor Force Data, September 2016 (https://www.bls.gov/cps/data.htm).

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study sample was based on HCP from opt-in Internet panels rather than probability samples, statistical testing was not conducted.¶ An increase or decrease of at least 5 percentage points between seasonal estimates was considered a change; estimates with smaller differences were considered similar.

Among the 2,547 HCP who started the survey from either Medscape or SSI and had eligible responses to the screening questions, 2,493 (97.9%) completed the survey.** Fifty-four respondents with completed surveys who reported working in "other health care settings" were excluded because examination of their survey responses indicated that they were either unlikely to have contact with patients or to have worked in one of the health care settings of interest for this analysis; in addition, one respondent whose work location was in Canada was excluded. The final analytic sample consisted of 2,438 HCP.

Overall, 78.6% of respondents reported having received an influenza vaccination during the 2016–17 season. Among all HCP, coverage increased from 63.5% in the 2010–11 season to 75.2% in the 2013–14 season, and ranged from 77.3% to 79.0% in subsequent seasons (Figure) (Table 1). As in previous surveys, coverage in the 2016–17 season was highest among HCP working in hospital settings (92.3%), followed by HCP working in ambulatory care (76.1%), other clinical settings (75.0%), or LTC (68.0%) settings. Coverage among HCP working in other clinical settings increased from 69.8% in 2015–16 to 75.0% in 2016–17; coverage in hospital, ambulatory care, and LTC settings was similar in 2015–16 and 2016–17 (Table 1). Among vaccinated HCP, 76.5% were vaccinated at their workplace.

Overall, vaccination coverage in 2016–17 was highest among physicians (95.8%), nurse practitioners and physician assistants (92.0%), nurses (92.6%), and pharmacists (93.7%), and lowest among other clinical HCP (80.0%), assistants and aides (69.1%), and nonclinical HCP (73.7%) (Table 1). However, in hospital settings, vaccination coverage was approximately 90% or higher in all occupational groups, including assistants and aides and nonclinical personnel.

Overall, 42.3% of HCP reported a requirement to be vaccinated for the 2016–17 season, an increase over the 2013–14 season but similar to the 2014–15 and 2015–16 seasons. HCP working in hospitals were more likely to report a vaccination requirement (69.5%) than were HCP working in ambulatory care (39.0%), LTC (26.2%), or other clinical settings (22.0%) (Table 2). HCP working in ambulatory care, LTC, and other clinical settings more often reported that their employer did not require, provide, or promote vaccination (21.7%, 30.5%, and 32.2%, respectively), compared with HCP working in hospital settings (3.9%).

¶ Additional information on obstacles to inference in nonprobability samples is available at http://www.aapor.org/Education-Resources/Reports/Non-Probability-Sampling.aspx.

** 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 panels described in this report, these numbers are not available; therefore, a response rate cannot be calculated. Instead, the survey cooperation rate is provided.

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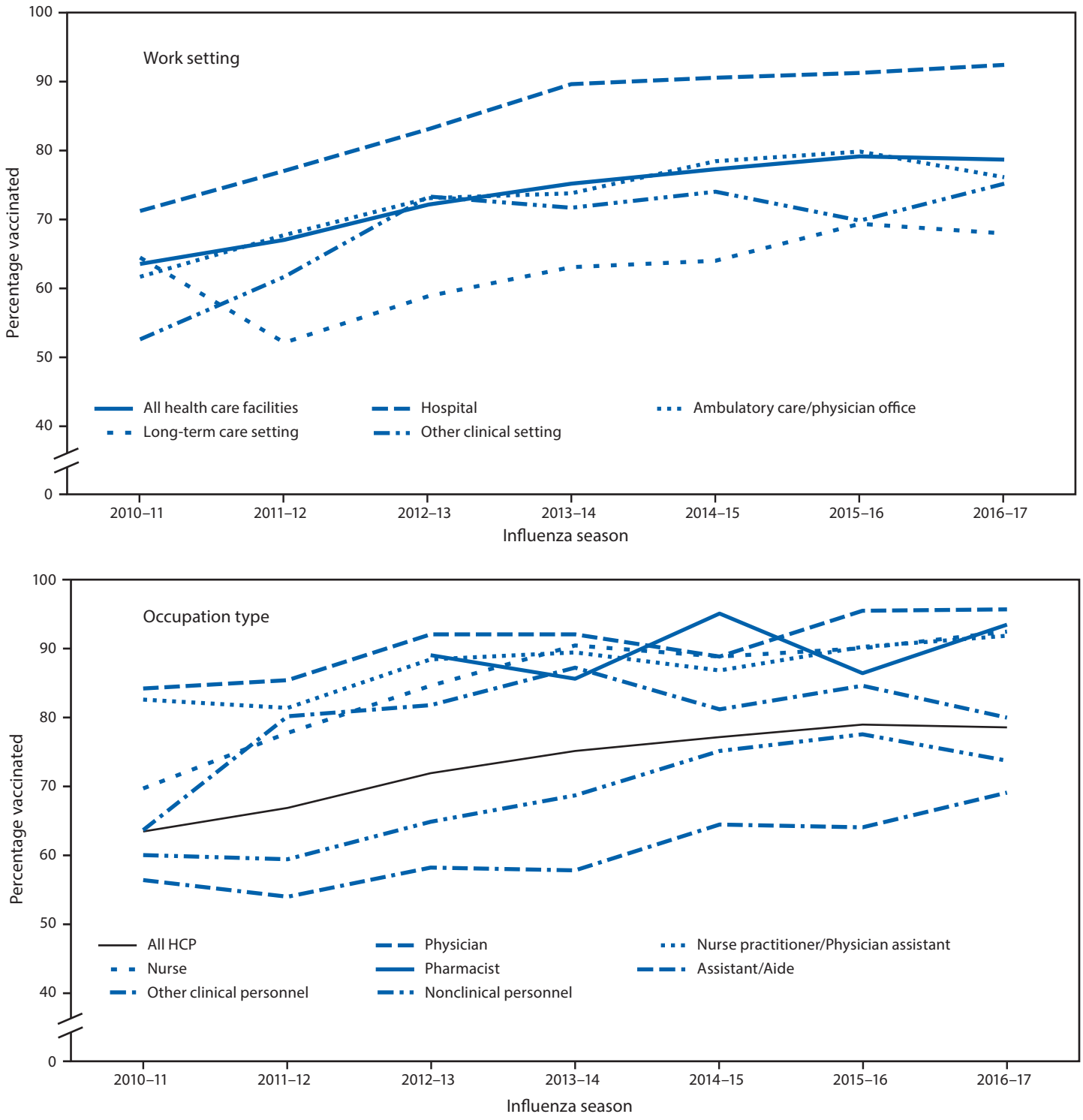
FIGURE. Percentage of health care personnel (HCP) who reported receiving influenza vaccination, by work setting* and occupation type†—Internet panel surveys, United States, 2010–11 through 2016–17 influenza seasons



* Respondents could select more than one work setting. The "ambulatory care/physician office" category includes physician's office, medical clinic, and other ambulatory care setting. The "other clinical setting" category includes dentist office or dental clinic, pharmacy, laboratory, public health setting, emergency medical services setting, or other setting where clinical care or related services were provided to patients.

† For the 2010–11 season, dentists were included in the physician category. Before the 2012–13 season, separate data on pharmacists were not collected. The "other clinical personnel" category includes allied health professionals, technicians, and technologists. The "nonclinical personnel" category includes administrative support staff members or managers and nonclinical support staff members (e.g., food service workers, laundry workers, janitors, and other members of the housekeeping and maintenance staffs).

TABLE 1. Percentage of health care personnel* (HCP) who reported receiving influenza vaccination, by work setting and occupation type — Internet panel surveys, United States, 2015–16 and 2016–17 influenza seasons

Work setting/Occupation type†	2015–16 season			2016–17 season			Percentage-point difference (2015–16 to 2016–17)
	No. in sample	Weighted %§	Weighted % vaccinated	No. in sample	Weighted %§	Weighted % vaccinated	
Overall	**2,258**	**100**	**79.0**	**2,438**	**100**	**78.6**	**-0.4**
Occupational setting, by occupation							
Hospital	**803**	**39.7**	**91.2**	**925**	**40.5**	**92.3**	**1.1**
Physician	127	3.7	99.4	129	4.2	97.8	-1.6
NP/PA	50	0.9	90.0	57	0.8	94.6	4.6
Nurse	95	23.8	94.6	108	28.5	96.4	1.8
Pharmacist	16	0.7	—¶	121	1.2	97.4	—
Assistant/Aide	107	8.9	88.2	118	8.4	91.1	2.9
Other clinical HCP**	236	23.4	94.4	232	22.0	90.0	-4.4
Nonclinical HCP††	155	38.2	87.2	144	34.6	89.7	2.5
Ambulatory care/Physician office§§	**648**	**27.6**	**79.8**	**718**	**28.8**	**76.1**	**-3.7**
Physician	216	10.4	95.2	198	9.5	94.8	-0.4
NP/PA	92	2.4	89.1	110	2.7	90.0	0.9
Nurse	45	20.6	88.6	48	20.5	93.3	4.7
Pharmacist	6	0.4	—¶	24	0.3	—¶	—
Assistant/Aide	57	9.2	62.0	74	9.5	74.4	12.4
Other clinical HCP**	135	22.0	81.7	139	22.9	71.1	-10.6
Nonclinical HCP††	91	34.8	72.9	111	34.1	63.0	-9.9
Long-term care setting	**659**	**29.6**	**69.2**	**549**	**29.3**	**68.0**	**-1.2**
Physician	17	0.8	—¶	15	0.7	—¶	—
NP/PA	7	0.2	—¶	7	0.2	—¶	—
Nurse	23	9.6	—¶	22	9.7	—¶	—
Pharmacist	1	0	—¶	6	0.1	—¶	—
Assistant/Aide	501	58.4	61.9	428	59.3	66.9	5.0
Other clinical HCP**	54	7.6	85.9	26	3.8	—¶	—
Nonclinical HCP††	54	23.3	70.9	44	26.3	60.7	-10.2
Other clinical setting¶¶	**409**	**11.6**	**69.8**	**604**	**12.6**	**75.0**	**5.2**
Physician	4	0.6	—¶	4	0.4	—¶	—
NP/PA	5	0.3	—¶	6	0.3	—¶	—
Nurse	15	15.2	—¶	15	15.3	—¶	—
Pharmacist	51	9.5	85.5	243	8.7	92.4	6.9
Assistant/Aide	42	15.4	51.2	54	15.2	63.1	11.9
Other clinical HCP**	257	32.9	72.5	240	35.3	76.5	4.0
Nonclinical HCP††	22	25.3	—¶	31	24.0	69.6	—
Overall occupation							
Physician	284	3.6	95.6	251	3.4	95.8	0.2
NP/PA	134	1.0	90.3	154	1.0	92.0	1.7
Nurse	168	18.5	90.1	167	18.6	92.6	2.5
Pharmacist	63	1.3	86.5	307	1.3	93.7	7.2
Assistant/Aide	673	23.8	64.1	641	23.9	69.1	5.0
Other clinical HCP**	599	18.8	84.7	572	18.9	80.0	-4.7
Nonclinical HCP††	307	32.9	77.7	315	32.6	73.7	-4.0

Abbreviations: NP = nurse practitioner; PA = physician assistant.

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

† Respondents could specify working in more than one setting.

§ Weights were calculated based on each occupation type, by age, sex, race/ethnicity, work setting, and U.S. Census region to represent the U.S. population of HCP. Work setting and overall occupation are presented as weighted estimates of the total sample. Where the groups are stratified by work setting, the estimates are presented as weighted estimates of the occupation group subsample of each work setting subgroup.

¶ Vaccination coverage estimate not reliable because the sample size was <30.

** Allied health professional, technician, or technologist.

†† Administrative support staff members or manager and nonclinical support staff members (including food service workers, laundry workers, janitors, and members of the housekeeping and maintenance staffs).

§§ Physician's office, medical clinic, or other ambulatory care setting.

¶¶ Dentist office or dental clinic, pharmacy, laboratory, public health setting, emergency medical services setting, or other setting where clinical care or related services was provided to patients.

As in previous seasons, vaccination coverage in 2016–17 was highest (96.7%) among HCP working in settings where vaccination was required, ranging from 90.0% in LTC settings to 98.3% in hospital settings (Table 2). Among HCP whose employers did not have a requirement for vaccination, coverage was higher among those who worked in locations where vaccination was available at the worksite at no cost for >1 day (80.3%) than among those with vaccination available for 1 day only (73.8%) or among those who worked in locations where their employer did not provide influenza vaccination on-site at no cost but actively promoted vaccination through other mechanisms[††] (70.4%). Vaccination coverage was lowest (45.8%) among HCP working in locations where employers did not require vaccination, provide vaccination on-site at no cost, or promote vaccination (Table 2).

Discussion

The overall influenza vaccination coverage estimate among HCP was 78.6% in the 2016–17 season, an increase of 15 percentage points since the 2010–11 season, but similar to the 2013–14 through 2015–16 seasons (*5*). As in previous seasons, the highest coverage was among HCP whose workplace had vaccination requirements. In the absence of requirements, HCP with vaccination available at their workplace had higher coverage than those without on-site vaccination. HCP working in hospital settings consistently reported higher vaccination coverage than did those working in other settings and were the most likely to report workplace vaccination requirements and on-site vaccination. Even in occupational groups with lower overall coverage (i.e., assistants, aides, and nonclinical personnel), hospital personnel reported vaccination coverage ≥90%. In the 2016–17 season, 93.7% of HCP working in hospital settings reported either having a vaccination requirement or having on-site vaccination for at least 1 day. Most vaccinated HCP reported being vaccinated at their place of work, underscoring the importance of workplace vaccination availability.

HCP working in LTC settings consistently have lower influenza vaccination coverage than do HCP working in all other health care settings. Influenza vaccination among HCP in LTC settings is especially important because influenza vaccine effectiveness is generally lowest in the elderly, who are at increased risk for severe disease (*2*). In addition, studies have demonstrated that vaccination of HCP in LTC settings confers a health benefit to patients, including reduced risk for mortality (*1–3*). In contrast to HCP working in hospitals, only 26.2% of respondents working in LTC settings reported having a workplace requirement for vaccination. Among HCP in LTC settings, 30.5% reported that their employer did not require vaccination, make vaccination available on-site at no cost, or promote vaccination in any way. Workplace vaccination programs that have been successful in increasing coverage in hospital settings could be implemented in LTC and other settings with lower vaccination coverage. Outside of hospital settings, assistants and aides, "other" clinical personnel, and nonclinical HCP have persistently low vaccination coverage. Although some facilities might not prioritize these groups for vaccination programs, especially nonclinical HCP, these personnel often spend considerable time with and in proximity to patients.

The findings in this report are subject to at least three limitations. First, the study used a nonprobability sample of volunteer members of Medscape and SSI Internet panels, which might affect the generalizability of these findings to the U.S. population of HCP. Second, vaccination status and vaccination requirements were self-reported and might be subject to recall bias. Finally, coverage findings from Internet survey panels have differed from population-based estimates from the National Health Interview Survey in past influenza seasons, although trends in coverage were similar across seasons (*8*,*9*).

The highest influenza vaccination coverage among HCP continues to be reported in worksites with employer requirements for vaccination. In the absence of vaccination requirements, the findings in this study support the recommendations found in the Guide to Community Preventive Services, which include active promotion of on-site vaccination at no cost or low cost to increase influenza vaccination coverage among HCP (*6*). Measurement of and feedback about vaccination coverage are additional interventions recommended by the Community Preventive Services Task Force (*6*). Federal reporting requirements might influence vaccination coverage by occupational setting (*10*). CDC's National Healthcare Safety Network (NHSN) has included reporting of health care personnel influenza vaccination since 2012. During 2013–2015, the Centers for Medicare & Medicaid Services (CMS) added requirements to report health care personnel influenza vaccination data through NHSN for acute care hospitals (2013), ambulatory surgery centers (2014), and outpatient hemodialysis facilities (2015), among other settings.[§§] LTC facilities currently are not covered by CMS quality reporting requirements. LTC employers can use the LTC web-based toolkit[¶¶] developed by CDC and the National Vaccine Program Office, which provides access to resources, strategies, and educational materials for increasing influenza vaccination among HCP in long-term care settings.

[††] Employer promoted influenza vaccination among employees through public identification of vaccinated persons, financial incentives or rewards to individual persons or groups of employees, competition between units or care areas, free or subsidized cost of vaccination, personal reminders to be vaccinated, or publicizing of the number or percentage of employees receiving vaccination.

[§§] https://www.cdc.gov/nhsn/cms/index.html.

[¶¶] https://www.cdc.gov/flu/toolkit/long-term-care/index.htm.

TABLE 2. Percentage of health care personnel* (HCP) who reported receiving influenza vaccination, by work setting, workplace vaccine availability, and employer vaccine requirements status — Internet panel surveys, United States, 2013–14 through 2016–17 influenza seasons

Characteristic	2013–14 season			2014–15 season			2015–16 season			2016–17 season		
	No. in sample	Weighted %†	Weighted % vaccinated	No. in sample	Weighted %†	Weighted % vaccinated	No. in sample	Weighted %†	Weighted % vaccinated	No. in sample	Weighted %†	Weighted % vaccinated
Employer vaccination requirement§	**738**	**35.5**	**97.8**	**725**	**40.1**	**96.0**	**841**	**37.8**	**96.5**	**983**	**42.3**	**96.7**
Hospital	520	58.2	97.7	440	64.8	97.2	510	61.0	96.5	644	69.5	98.3
Ambulatory care/ Physician office¶	252	33.6	96.4	277	34.7	96.1	258	33.9	98.7	305	39.0	97.2
Long-term care	88	20.1	98.4	104	26.0	97.3	143	23.4	93.8	142	26.2	90.0
Other clinical setting**	88	29.3	99.5	109	35.9	85.7	101	24.9	98.5	135	22.0	98.2
On-site vaccination >1 day††	**542**	**25.1**	**80.4**	**407**	**19.1**	**83.9**	**460**	**19.8**	**82.8**	**434**	**15.2**	**80.3**
Hospital	261	31.4	82.0	151	21.0	86.9	173	23.8	81.8	152	13.8	80.9
Ambulatory care/ Physician office¶	183	28.6	80.7	165	23.1	87.8	152	20.8	85.1	118	16.6	82.3
Long-term care	63	11.7	71.6	57	12.4	67.3	96	16.1	80.4	61	14.0	76.1
Other clinical setting**	107	22.0	85.0	97	15.6	81.9	87	12.3	84.1	155	15.6	82.8
On-site vaccination 1 day§§	**169**	**7.6**	**61.6**	**230**	**9.8**	**73.6**	**254**	**10.9**	**82.1**	**361**	**14.2**	**73.8**
Hospital	43	4.2	55.6	51	7.3	72.1	70	8.3	81.1	82	10.4	78.3
Ambulatory care/ Physician office¶	76	11.3	69.3	104	10.9	80.6	76	12.8	82.9	126	16.7	73.2
Long-term care	43	10.0	54.1	45	10.0	67.1	77	11.5	83.0	77	15.6	66.7
Other clinical setting**	31	6.5	72.9	50	10.8	80.4	54	14.2	85.2	111	15.2	78.6
Other vaccination promotion***	**226**	**15.5**	**61.9**	**216**	**12.4**	**59.5**	**293**	**13.0**	**67.8**	**206**	**8.2**	**70.4**
Hospital	46	5.1	80.7	24	4.4	—¶¶	39	4.6	91.0	31	2.5	81.8
Ambulatory care/ Physician office¶	66	12.2	53.5	67	10.3	60.5	62	11.9	74.0	46	6.1	59.6
Long-term care	90	29.8	62.2	83	21.6	58.5	139	21.4	63.4	69	13.7	71.7
Other clinical setting**	50	16.9	57.5	54	14.6	64.5	67	16.4	54.0	77	15.1	76.7
No requirement, on-site vaccination or promotion	**207**	**16.3**	**36.8**	**336**	**18.7**	**44.0**	**409**	**18.4**	**44.9**	**454**	**20.0**	**45.8**
Hospital	10	1.2	—¶¶	15	2.6	—¶¶	11	2.3	—¶¶	16	3.9	—¶¶
Ambulatory care/ Physician office¶	72	14.3	26.8	133	21.0	46.6	100	20.6	45.0	123	21.7	40.1
Long-term care	80	28.5	38.6	117	30.0	36.4	204	27.7	40.6	200	30.5	44.3
Other clinical setting**	51	25.3	36.9	79	23.2	53.4	100	32.1	43.4	126	32.2	52.8

* Persons who worked in a place where clinical care or related services were provided to patients, or whose work involved 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, work setting, and U.S. Census region to represent the U.S. population of HCP. Work setting and overall occupation are presented as weighted estimates of the total sample. Where the groups are stratified by work setting, the estimates are presented as weighted estimates of the occupation group subsample of each work setting subgroup.

§ Includes all respondents who indicated that their employer required them to be vaccinated for influenza.

¶ Physician's office, medical clinic, or other ambulatory care setting.

** Dentist office or dental clinic, pharmacy, laboratory, public health setting, health care education setting, emergency medical services setting, or other setting where clinical care or related services was provided to patients.

†† Employer made influenza vaccination available on-site for >1 day during the influenza season at no cost to employees. Restricted to respondents without an employer requirement for vaccination.

§§ Employer made influenza vaccination available on-site for 1 day during the influenza season at no cost to employees. Restricted to respondents without an employer requirement for vaccination.

¶¶ Vaccination coverage estimate not reliable because the sample size was <30.

*** Influenza vaccination was promoted among employees through public identification of vaccinated persons, financial incentives, or rewards to individuals or groups of employees, competition between units or care areas, free or subsidized cost of vaccination, personal reminders to be vaccinated, or publicizing of the number or percentage of employees receiving vaccination. Restricted to respondents without an employer requirement for vaccination or on-site vaccination.

Summary

What is already known about this topic?

The Advisory Committee on Immunization Practices recommends annual influenza vaccination for all health care personnel (HCP) to reduce influenza-related morbidity and mortality in health care settings. For the 2015–16 influenza season, the estimated overall influenza vaccination coverage among health care personnel was 79.0%.

What is added by this report?

Influenza vaccination coverage among HCP during the 2016–17 influenza season, assessed using an opt-in Internet panel survey, was 78.6%, similar to coverage during the 2015–16 season. Employer vaccination requirements and offering vaccination at the workplace at no cost were associated with higher vaccination coverage. Occupational settings with the lowest influenza vaccination coverage were the least likely to require vaccination or provide vaccination on-site at no cost.

What are the implications for public health practice?

Employer vaccination requirements or, in the absence of requirements, offering influenza vaccination on-site at no cost, can achieve high HCP vaccination coverage. Implementing comprehensive evidence-based worksite intervention strategies is important to ensure HCP and patients are protected against influenza.

Conflict of Interest

No conflicts of interest were reported.

[1]Immunization Services Division, National Center for Immunization and Respiratory Diseases, CDC; [2]Abt Associates Inc., Cambridge, Massachusetts; [3]Division of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CDC; [4]Division of Respiratory Health, National Institute for Occupational Safety and Health, CDC.

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References

1. CDC. Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep 2011;60(No. RR-7).
2. Hayward AC, Harling R, Wetten S, et al. Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity, and health service use among residents: cluster randomised controlled trial. BMJ 2006;333:1241. https://doi.org/10.1136/bmj.39010.581354.55
3. Lemaitre M, Meret T, Rothan-Tondeur M, et al. Effect of influenza vaccination of nursing home staff on mortality of residents: a cluster-randomized trial. J Am Geriatr Soc 2009;57:1580–6. https://doi.org/10.1111/j.1532-5415.2009.02402.x
4. Saxén H, Virtanen M. Randomized, placebo-controlled double blind study on the efficacy of influenza immunization on absenteeism of health care workers. Pediatr Infect Dis J 1999;18:779–83. https://doi.org/10.1097/00006454-199909000-00007
5. Black CL, Yue X, Ball SW, et al. Influenza vaccination coverage among health care personnel—United States, 2015–16 influenza season. MMWR Morb Mortal Wkly Rep 2016;65:1026–31. https://doi.org/10.15585/mmwr.mm6538a2
6. Community Preventive Services Task Force. Vaccination. Atlanta, GA: US Department of Health and Human Services, CDC, Community Preventive Services Task Force; 2008. https://www.thecommunityguide.org/topic/vaccination
7. Black CL, Yue X, Ball SW, et al. Influenza vaccination coverage among health care personnel—United States, 2013–14 influenza season. MMWR Morb Mortal Wkly Rep 2014;63:805–11.
8. CDC. Surveillance of influenza vaccination coverage—United States, 2007–08 through 2011–12 influenza seasons. MMWR Surveill Summ 2013;62(No. SS-04).
9. Williams WW, Lu PJ, O'Halloran A, et al. Surveillance of vaccination coverage among adult populations—United States, 2015. MMWR Surveill Summ 2017;66(No. SS-11). https://doi.org/10.15585/mmwr.ss6611a1
10. Lindley MC, Bridges CB, Strikas RA, et al. Influenza vaccination performance measurement among acute care hospital-based health care personnel—United States, 2013–14 influenza season. MMWR Morb Mortal Wkly Rep 2014;63:812–5.

Influenza Vaccination Coverage Among Pregnant Women — United States, 2016–17 Influenza Season

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Pregnant women and their infants are at increased risk for severe influenza-associated illness (*1*), and since 2004, the Advisory Committee on Immunization Practices (ACIP) has recommended influenza vaccination for all women who are or might be pregnant during the influenza season, regardless of the trimester of the pregnancy (*2*). To assess influenza vaccination coverage among pregnant women during the 2016–17 influenza season, CDC analyzed data from an Internet panel survey conducted during March 28–April 7, 2017. Among 1,893 survey respondents pregnant at any time during October 2016–January 2017, 53.6% reported having received influenza vaccination before (16.2%) or during (37.4%) pregnancy, similar to coverage during the preceding four influenza seasons. Also similar to the preceding influenza season, 67.3% of women reported receiving a provider offer for influenza vaccination, 11.9% reported receiving a recommendation but no offer, and 20.7% reported receiving no recommendation; among these women, reported influenza vaccination coverage was 70.5%, 43.7%, and 14.8%, respectively. Among women who received a provider offer for vaccination, vaccination coverage differed by race/ethnicity, education, insurance type, and other sociodemographic factors. Use of evidence-based practices such as provider reminders and standing orders could reduce missed opportunities for vaccination and increase vaccination coverage among pregnant women.*

Since 2011, an Internet panel survey has been conducted for CDC by Abt Associates, Inc. (Cambridge, Massachusetts) at the beginning of each April to provide end-of-season estimates of influenza vaccination coverage among pregnant women and assess factors associated with vaccination. The Internet panel† and survey methodology have been described previously (*3*). The 2016–17 survey was conducted during March 28–April 7, 2017, among women aged 18–49 years who reported being pregnant at any time since August 1, 2016. Among 10,734 women who entered the survey site, 2,399 were eligible and 2,319 completed the survey (a cooperation rate of 96.7%).§ Data were weighted to reflect the age, race/ethnicity, and geographic distribution of the total U.S. population of pregnant women. A woman was considered to be vaccinated for the 2016–17 season if she reported receiving vaccination before or during her most recent pregnancy since July 1, 2016. Analysis was limited to 1,893 women who reported being pregnant any time during the peak influenza vaccination period (October 2016–January 2017). A difference was noted as an increase or decrease when a ≥5 percentage-point difference occurred between any values being compared.¶

Influenza vaccination coverage among pregnant women in 2016–17 was similar to coverage during the previous four seasons (Figure). Among women pregnant during the 2016–17 influenza season, 53.6% reported receiving influenza vaccination before (16.2%) or during (37.4%) pregnancy since July 1, 2016 (Table 1). Coverage among women aged 18–24 years (41.7%) was lower than coverage among women aged 25–34 years (58.4%) and 35–49 years (58.5%). Coverage among Hispanic women (61.2%) was higher than that among non-Hispanic white (white) women (55.4%) and non-Hispanic black (black) women (42.3%); these differences were not observed during the 2015–16 season. Higher vaccination coverage was found among women with higher level of education, married women, women with private or military insurance, working women, women at or above poverty level, women with a high-risk condition, women with positive attitude toward vaccination effectiveness or safety, and women who were concerned about influenza infection, similar to the 2015–16 season.

The proportion of women who reported receiving a provider recommendation for and offer** of vaccination was 67.3% in the 2016–17 season, similar to that during the past four seasons (Figure). During both the 2015–16 and 2016–17 seasons, women who reported receiving both a provider recommendation for and offer of influenza vaccination had higher vaccination coverage (63.4% [2015–16] and 70.5%

* Guide to Community Preventive Services: Vaccination; https://www.thecommunityguide.org/topic/vaccination.

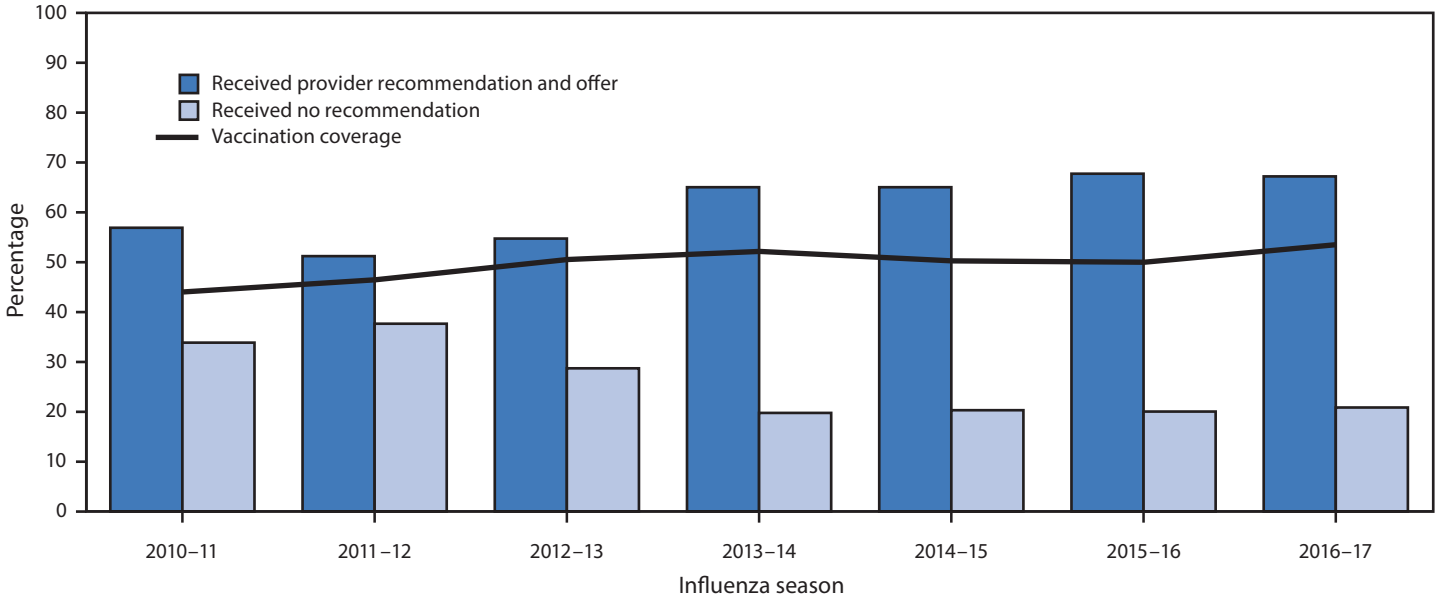
† Additional information on the online survey and incentives for participants is available at https://www.surveysampling.com.

§ An opt-in Internet panel survey is a nonprobability sampling survey. The denominator for a response rate calculation cannot be determined because no sampling frame with a selection probability is involved at the recruitment stage. Instead, the survey cooperation rate is provided.

¶ Additional information on obstacles to inference in nonprobability samples is available at http://www.aapor.org/Education-Resources/Reports/Non-Probability-Sampling.aspx.

** "Recommendation and offer" is based on a "yes" response to the question "Since July 2016, during any of your visits to a doctor, nurse, or medical professional, did any of these medical professionals offer to give you a flu vaccination during a visit?"

FIGURE. Prevalence of provider recommendation for and offer of influenza vaccination* and influenza vaccination coverage† among women pregnant any time during October–January — Internet panel survey, United States, 2010–11 through 2016–17 influenza seasons



* Among women who reported having at least one visit to a provider since July.
† Vaccination coverage estimates for the 2012–13 through 2016–17 influenza seasons were based on vaccination given from July to mid-April; coverage estimates for the 2010–11 and 2011–12 influenza seasons were based on vaccination given from August to mid-April.

[2016–2017]) compared with women who reported receiving a provider recommendation but no offer†† (37.5% and 43.7%) and women who reported receiving no recommendation for vaccination§§ (12.8% and 14.8%) (Table 1); this pattern was observed among all age groups, racial/ethnic groups, levels of education, marital status, some level of insurance coverage, poverty status, number of health care visits, presence or absence of a high-risk condition, attitudes regarding efficacy and safety of influenza vaccine, and concern about influenza infection (Table 2). An increased number of provider visits since July 2016 was associated with both an increase in women's report of receiving a provider recommendation and an increase in vaccination coverage estimates (65.7% [1–5 visits]; 70.9% [6–10 visits]; 72.1% [>10 visits]). Women in the following subgroups reported receiving a provider recommendation for and offer of vaccination less frequently than did women in the reference category of each stratum: aged 18–24 years, with a college degree, without medical insurance, without a high-risk condition other than pregnancy, with a negative attitude toward influenza vaccination effectiveness or safety, or not concerned about influenza infection (Table 2).

Vaccination coverage differed within some subgroups that reported similar proportions of receipt of a provider recommendation for and offer of vaccination. For example, although 68%–69% of insured women reported being offered vaccination, coverage was 74.7% among women with private or military insurance and 63.9% among women with public insurance. Differences in coverage among women who were offered vaccination were also observed between white and black women and women with more than a college degree and those with a college degree or less (Table 2). Among insured women who were offered vaccination, a higher proportion of publically insured women were younger (18–24 years), black, had less than a college degree, and lived below the poverty threshold compared with privately insured women.

Among the 221 (11.9%) women who reported that their provider recommended but did not offer vaccination, 114 (51.0%) received a referral¶¶ to go somewhere else to be vaccinated; 36.7% of the women receiving a referral were vaccinated,

†† "Recommendation but no offer" is based on a "yes" response to the question "Since July 2016, during any of your visits to a doctor, nurse, or other medical professional, did any of these medical professionals recommend that you get a flu vaccination or tell you that you needed a flu vaccination?" and a "no" response to the question "Since July 2016, during any of your visits to a doctor, nurse, or medical professional, did any of these medical professionals offer to give you a flu vaccination during a visit?"

§§ "No recommendation" is based on a "no" response to the questions "Since July 2016, during any of your visits to a doctor, nurse, or other medical professional, did any of these medical professionals recommend that you get a flu vaccination or tell you that you needed a flu vaccination?" and "Since July 2016, during any of your visits to a doctor, nurse, or medical professional, did any of these medical professionals offer to give you a flu vaccination during a visit?"

¶¶ Referral is defined based on a "yes" response to the question "Did any doctor, nurse, or medical professional suggest that you go someplace else to get the flu vaccination?"

TABLE 1. Influenza vaccination coverage before and during pregnancy among women pregnant any time during October–January, by selected characteristics, Internet panel surveys, United States, 2016-17 and 2015-2016 influenza seasons

Characteristic	2015–16 influenza season			2016–17 influenza season			Percentage point difference in vaccination coverage 2016–17 to 2015–16
	Unweighted no.	Weighted %	Vaccinated, weighted %	Unweighted no.	Weighted %	Vaccinated, weighted %	
Total	**1,692**	—	**49.9**	**1,893**	—	**53.6**	**3.7**
Vaccinated before pregnancy	239	—	14.1	292	—	16.2	2.1
Vaccinated during pregnancy	605	—	35.8	750	—	37.4	1.6
Age group (yrs)							
18–24	417	28.9	49.4	464	28.6	41.7*	–7.7†
25–34	981	53.6	49.8	1,087	53.8	58.4	8.6†
35–49§	294	17.5	51.2	342	17.6	58.5	7.3†
Race/Ethnicity							
Hispanic	366	22.1	51.8	257	21.5	61.2*	9.3†
Black, non-Hispanic	277	19.8	49.4	262	20.8	42.3*	–7.1†
White, non-Hispanic§	898	50.4	49.0	1,200	50.2	55.4	6.4†
Other, non-Hispanic	151	7.7	52.1	174	7.5	51.7	-0.4
Education							
<College degree	872	53.1	46.5*	672	37.9	47.3*	0.8
College degree	642	36.8	52.6*	910	46.4	52.7*	0.1
>College degree§	178	10.2	58.2	311	15.7	71.7	13.6†
Married							
Yes§	1,044	59.8	53.5	1,386	70.2	56.7	3.2
No	648	40.2	44.6*	507	29.8	46.4*	1.8
Insurance coverage							
Any public	672	41.3	46.8*	568	32.9	47.6*	0.8
Private/Military only§	983	56.6	53.5	1,250	63.0	59.3	5.8†
No insurance	37	2.1	14.9*	75	4.1	14.6*	-0.3
Working status¶							
Yes§	950	56.1	53.9	1,239	65.4	57.1	3.2
No	742	43.9	44.9*	654	34.6	47.2*	2.3
Poverty status**							
At or above poverty§	1,312	76.4	52.0	1,688	88.2	55.1	3.2
Below poverty	377	23.6	43.1*	204	11.8	42.5*	-0.6
High-risk condition††							
Yes§	728	43.0	55.6	729	38.2	63.3	7.7†
No	964	57.0	45.7*	1,164	61.8	47.7*	2.0
Number provider visits since July							
None	10	0.6	—§§	69	4.3	6.1*	
1–5	326	19.6	39.5*	430	22.6	39.8*	0.3
6–10	706	41.5	50.0*	720	37.9	58.8	8.7†
>10§	650	38.3	55.7	674	35.2	62.7	7.0†

See table footnotes on next page.

compared with only 12.5% of women who received a provider recommendation but no offer or referral.

Discussion

Influenza vaccination coverage among pregnant women in 2016–17 was 53.6%, similar to coverage in the 2012–13 through 2015–16 influenza seasons. Similar to the past three seasons, 67.3% of pregnant women in 2016–17 reported receiving a provider recommendation for and offer of vaccination. Although the Standards for Adult Immunization Practice (*4*) support recommendation for and offer of influenza vaccination, the percentage of currently or recently pregnant women who reported receiving a provider recommendation and offer has not changed during the last four influenza seasons. This might be partly attributable to differences in perception among patients and providers of a recommendation for or offer of vaccination. In a recent survey of obstetric care providers conducted by the American College of Obstetricians and Gynecologists (ACOG), all surveyed providers reported that they recommend influenza vaccine to their pregnant patients; however, only 85% of patients surveyed at the same practices reported receiving a recommendation for vaccination, suggesting that although providers believe they are giving a recommendation for vaccination, the recommendation might not be communicated effectively (*5*).

Vaccination differences were seen by race/ethnicity, concerns about vaccination and influenza, insurance status, and number of provider visits. As has previously been observed, black women had lower vaccination coverage and Hispanic women had higher vaccination coverage compared with white women, despite similar percentages among each racial/ethnic group reporting a provider

TABLE 1. (*Continued*) Influenza vaccination coverage before and during pregnancy among women pregnant any time during October–January, by selected characteristics, Internet panel surveys, United States, 2016-17 and 2015-2016 influenza seasons

Characteristic	2015–16 influenza season			2016–17 influenza season			Percentage point difference in vaccination coverage 2016–17 to 2015–16
	Unweighted no.	Weighted %	Vaccinated, weighted %	Unweighted no.	Weighted %	Vaccinated, weighted %	
Provider recommendation/offer¶¶							
Recommended and offered§	1,133	67.6	63.4	1,238	67.3	70.5	7.1†
Recommended with no offer	218	12.5	37.5*	221	11.9	43.7*	6.2†
No recommendation	331	19.9	12.8*	363	20.7	14.8*	2.0
Attitude toward effectiveness of influenza vaccination* **							
Positive§	1,313	77.9	61.8	1,473	77.8	65.8	4.0
Negative	379	22.1	8.0*	420	22.2	10.8*	2.8
Attitude toward safety of influenza vaccination†††							
Positive§	1,265	74.6	62.8	1,467	75.4	66.9	4.1
Negative	427	25.4	12.2*	426	24.6	12.9*	0.7
Attitude toward influenza infection§§§							
Concerned§	1,059	62.9	54.0	1,231	64.6	58.8	4.7
Not concerned	633	37.1	43.0*	662	35.4	44.3*	1.3

* ≥5 percentage-point difference compared with reference group.
† ≥5 percentage-point difference from 2015–16 to 2016–17 influenza season.
§ Reference group for comparison within subgroups.
¶ Women who were employed for wages and self-employed were categorized as working; those who were out of work, homemakers, students, retired, or unable to work were categorized as not working.
** As determined by the U.S. Census Bureau (https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html). For 2016–17 season, below poverty = a total of annual family income <$24,339 for a family of four with two minors as of 2016; for 2015–16 season, below poverty = total family income of <$24,036 for a family of four with two minors as of 2015.
†† 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 medicines taken for a chronic illness.
§§ Vaccination coverage estimates were suppressed because sample size was <30.
¶¶ Excluded women who had no provider visit since July 2016 (n = 69) for 2016-17 influenza season and women who had no provider visit since July 2016 (n = 10) for 2015-16 influenza season.
*** Created based on two questions regarding attitudes toward effectiveness of influenza vaccination: "Flu vaccine is somewhat/very effective in preventing flu"; and "Flu vaccine a pregnant woman received is somewhat/very effective in protecting her baby from the flu." One point was given for each "yes" answer for either of the two questions. Respondents with a summary score of 1 or 2 were considered to have a "positive" attitude, and those with a summary score of 0 were considered to have a "negative" attitude.
††† Created based on three questions regarding the safety of influenza vaccination: "Flu vaccination is somewhat/very/completely safe for most adult women"; "Flu vaccination is somewhat/very/completely safe for pregnant women"; and "Flu vaccination that a pregnant woman receives is somewhat/very/completely safe for her baby." One point was given for each "yes" answer for any of the three questions. Respondents who had a summary score of 2 or 3 were considered to have a "positive" attitude, and those with a summary score of 1 or less were considered to have a "negative" attitude.
§§§ Created based on response to three questions regarding attitudes regarding influenza infection: "If a pregnant women gets the flu, it is somewhat/very likely to harm the baby"; "Flu infection during pregnancy is somewhat/very likely harm pregnant women"; and "Flu infection during pregnancy somewhat/very likely harm her baby." One point was given for each "yes" answer for any of the three questions. Respondents who had a summary score of 2 or 3 were considered to be "concerned" and those with a summary score of 1 or less were considered to be "not concerned."

recommendation for and offer of vaccination (*3*). One study found that racial differences in vaccination coverage among pregnant women persisted after adjustment for a provider recommendation for or offer of influenza vaccination, insurance status, and demographic factors (*6*), and another study suggests that racial disparities might be caused by differences in sociocultural norms, misperception of effectiveness and safety of vaccination, and vaccination resistance and hesitancy (*7*), or could be modified or confounded by other factors such as age, education, or insurance status.

Although many women reported concerns about the safety or effectiveness of vaccination, these women were more likely to be vaccinated when there was a provider recommendation and offer compared with women with vaccination concerns who did not receive a vaccination recommendation from their provider, underscoring the need for providers to educate and counsel all pregnant patients. Although vaccination coverage increased with number of provider visits, 37% of women who had more than 10 visits were not vaccinated, indicating missed vaccination opportunities. Assessing vaccination status at every clinical encounter and providing an effective recommendation for and offer of vaccination can help ensure that more pregnant women receive influenza vaccine during pregnancy (*4*). ACOG has developed a toolkit to assist providers in integrating vaccination services and effective recommendations into their practice, including communication strategies and other resources.***

In this report, vaccination coverage was lower among pregnant women with public health insurance than among those with private or military insurance, at each level of provider recommendation

*** http://immunizationforwomen.org/providers/resources/toolkits/immunization.php.

TABLE 2. Percentage of women receiving a provider recommendation/offer of influenza vaccination and self-reported influenza vaccination coverage, by provider recommendation and offer among women who visited a provider at least once since July 2016 and who were pregnant any time during October 2016–January 2017 — Internet Panel Survey, United States, 2016–17 influenza season

	Provider recommendation for/offer of influenza vaccination				Vaccination coverage					
					Provider recommended, offered		Provider recommended, no offer		No recommendation	
Characteristic	Unweighted no.	Recommended, offered, weighted %	Recommended, no offer, weighted %	No recommendation, weighted %	Unweighted no.	Weighted %	Unweighted no.	Weighted %	Unweighted no.	Weighted %
Total	**1,822**	**67.3**	**11.9**	**20.7**	**1,238**	**70.5**	**221**	**43.7**	**363**	**14.8**
Age group (yrs)										
18–24	408	61.0*	10.6	28.3*	249	65.2*	46	26.7*	113	14.8
25–34	1,074	69.1	12.6	18.3	746	72.6	136	49.6	192	14.5
35–49†	340	71.1	11.7	17.2	243	71.1	39	46.9	58	15.8
Race/Ethnicity										
Hispanic	254	70.1	9.1	20.8	181	75.8*	23	—§	50	21.5*
Black, non-Hispanic	216	64.4	12.3	23.3	137	64.9*	25	—§	54	9.8
White, non-Hispanic†	1,180	67.7	13.0	19.3	807	70.8	153	44.6	220	13.6
Other, non-Hispanic	172	64.1	12.2	23.7	113	65.7	20	—§	39	16.6
Education										
<College degree	660	67.6	10.2	22.2	443	62.0*	69	30.3*	148	13.3*
College degree	853	65.4*	12.3	22.3	573	73.6*	106	41.6*	174	15.0*
>College degree†	309	71.9	15.1	13.0	222	82.1	46	70.2	41	20.3
Married										
Yes†	1,330	68.4	12.9	18.7	920	73.1	172	51.1	238	15.3
No	492	65.0	9.6	25.4	318	64.3*	49	20.9*	125	14.0
Insurance coverage										
Private/Military only†	1,221	68.3	12.8	18.9	847	74.7	163	48.7	211	17.8
Any public	540	69.3	10.4	20.3	371	63.9*	53	31.8*	116	12.0*
No insurance	61	30.2*	9.8	60.0	20	—§	5	—§	36	6.2
Working status¶										
Yes†	1,176	68.0	12.3	19.7	803	74.8	152	49.8	221	17.4
No	646	66.2	11.3	22.5	435	62.7*	69	32.0*	142	10.8*
Poverty status**										
At or above poverty†	1,624	66.7	12.3	21.0	1,099	73.0	203	46.9	322	14.5
Below poverty	197	72.2*	8.9	18.9	138	54.1*	18	—§	41	17.6

See table footnotes on next page.

for or offer of vaccination; frequency of provider recommendation or offer was similar for women with public and private or military insurance. This was also found among women with less than a college degree compared with women with more than a college degree. Lower vaccination coverage has been reported among pregnant women with public insurance (*8*) and women with lower levels of education (*3*).††† Further work is needed to understand and address barriers to receipt of influenza vaccination by pregnant women covered by public insurance and with less than a college degree.

The findings in this report are subject to at least four limitations. First, a nonprobability sample that did not include women without Internet access was used in the analysis; therefore, results are not generalizable to all pregnant women in the United States. Second, vaccination status was self-reported and might be subject to recall bias or social desirability bias. Third, because the Internet panel survey is an opt-in survey, estimates might be biased if a woman's decision to join the internet panel or participate in this particular survey were related to receipt of vaccination. Vaccination coverage estimates from the Internet panel survey have been consistently 5–10 percentage points higher than estimates from the less timely probability-based National Health Interview Survey. However, both surveys have found similar stable trends with no increasing coverage.§§§ Strengths and limitations of the Internet panel survey compared with probability sampling surveys can be found

††† https://archive.cdph.ca.gov/HealthInfo/discond/Documents/MihaFactSheet.pdf.

§§§ https://www.healthypeople.gov/2020/data-search/Search-the-Data#objid=6362;.

TABLE 2. (*Continued*) Percentage of women receiving a provider recommendation/offer of influenza vaccination and self-reported influenza vaccination coverage, by provider recommendation and offer among women who visited a provider at least once since July 2016 and who were pregnant any time during October 2016–January 2017 — Internet Panel Survey, United States, 2016–17 influenza season

Characteristic	Provider recommendation for/offer of influenza vaccination				Vaccination coverage					
					Provider recommended, offered		Provider recommended, no offer		No recommendation	
	Unweighted no.	Recommended, offered, weighted %	Recommended, no offer, weighted %	No recommendation, weighted %	Unweighted no.	Weighted %	Unweighted no.	Weighted %	Unweighted no.	Weighted %
High-risk condition††										
Yes†	724	75.1	10.3	14.6	546	75.3	74	48.5	104	14.1
No	1,098	62.2*	13.0	24.8	692	66.7*	147	41.3*	259	15.1
Number of provider visits since July 2016										
1–5	429	48.3*	13.5	38.3	217	65.7*	58	25.4*	154	12.2*
6–10	720	71.4	11.8	16.8	517	70.9	85	46.0*	118	16.1
>10†	673	75.2	11.1	13.7	504	72.1	78	55.3	91	17.8
Attitude toward efficacy of influenza vaccination§§										
Positive†	1,430	72.0	11.4	16.7	1,037	80.5	164	54.5	229	22.4
Negative	392	50.3*	14.1	35.7	201	17.9*	57	11.7*	134	1.9*
Attitude toward safety of influenza vaccination¶¶										
Positive†	1,421	73.8	11.6	14.6	1,047	80.4	169	56.3	205	22.6
Negative	401	47.0*	13.0	40.0	191	21.3*	52	8.1*	158	5.9*
Attitude toward influenza infection***										
Concerned†	1,182	70.1	11.5	18.4	839	74.5	139	50.7	204	17.7
Not concerned	640	62.3*	12.8	25.0	399	62.5*	82	32.4*	159	11.0*

* ≥5 percentage point difference compared with reference group.
† Reference group for comparisons within subgroups.
§ Vaccination coverage estimates were suppressed because sample size was <30.
¶ Persons who were employed for wages and self-employed were categorized as working. Those who were out of work, homemakers, students, retired, or unable to work were categorized as not working.
** As determined by the U.S. Census Bureau (https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html). For 2016–17 season, below poverty = a total of annual family income <$24,339 for a family of four with two minors as of 2016.
†† 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 medicines taken for a chronic illness.
§§ Created based on two questions regarding attitudes toward influenza vaccination: "Flu vaccine is somewhat/very effective in preventing flu"; and "Flu vaccine a pregnant women received is somewhat/very effective in protecting her baby from the flu." 1 point was given for each "yes" answer for either of the two questions. Respondents with a summary score of 1 or 2 were defined to have a "positive" attitude, and those with a summary score of 0 were defined to have a "negative" attitude.
¶¶ Created based on three questions regarding the safety of influenza vaccination: "Flu vaccination is somewhat/very/completely safe for most adult women"; "Flu vaccination is somewhat/very/completely safe for pregnant women"; and "Flu vaccination that a pregnant women receives is somewhat/very/completely safe for her baby." 1 point was given for each "yes" answer for any of the three questions. Respondents who had a summary score of 2 or 3 were defined to have a "positive" attitude, and those with a summary score of 1 or less were defined to have a "negative" attitude.
*** Created based on response to three questions regarding attitude toward influenza infection: "If a pregnant women gets the flu, it is somewhat/very likely to harm the baby"; "Flu infection during pregnancy somewhat/very likely harm pregnant women"; and "Flu infection during pregnancy somewhat/very likely harm her baby." 1 point was given for each "yes" answer for any of the three questions. Respondents who had a summary score of 2 or 3 were defined as "Concerned" and those with a summary score of 1 or less were defined as "Not concerned."

elsewhere (*9*). Finally, the composite variables computed for attitudes toward influenza vaccination and infection were not validated.

Findings in this report support evidence that a provider's recommendation for and offer of influenza vaccination to pregnant women is associated with receipt of vaccination. Women who were referred to another provider for vaccination were more likely to be vaccinated than women who did not receive an offer or referral. The Standards for Adult Immunization Practices call for all providers to strongly recommend needed vaccines and either administer vaccines or refer patients to a provider who can administer them (*4*). ACOG and Text4Baby¶¶¶ provide resources to ensure recommendations are provided effectively to help women receive influenza vaccination as early as possible during pregnancy. Vaccination coverage of pregnant women can be increased by a combination of 1) implementation of evidence-based practices (e.g., provider reminders and standing orders for vaccination) to ensure that influenza vaccination is recommended and offered at each visit before and during pregnancy or that the patient is referred to an influenza vaccine provider, and 2) clinical education about the risk for influenza infection and safety and benefit of influenza vaccination (*10*). Further work is needed to understand differences in vaccination coverage among women who were offered vaccination by a provider.

¶¶¶ https://www.text4baby.org.

Summary

What is already known about this topic?

Pregnant women and infants are at increased risk for influenza-related complications and hospitalization. Vaccinating pregnant women can reduce their risk for influenza-related respiratory illness and reduce the risk for influenza in their infants aged <6 months. A provider recommendation for and offer of vaccination is associated with higher vaccination coverage among pregnant women.

What is added by this report?

Analysis of data from a 2017 Internet panel survey indicates that in the 2016–17 influenza season, 53.6% of pregnant women were vaccinated before or during pregnancy, similar to the 2015–16 season. Prevalence of provider recommendation for and offer of vaccination were similar to those in the last four influenza seasons. Most women who reported receiving both a provider recommendation for and offer of influenza vaccination had high vaccination coverage (70.5%), but this varied for those with public insurance (63.9%) and by other sociodemographic factors.

What are the implications for public health practice?

To improve protection from complications of influenza for mothers and infants, measures to improve vaccination coverage are needed. Implementing the Standards for Adult Immunization Practice, which recommend all health care providers assess, recommend, administer or refer, and document vaccinations, can help ensure pregnant women are fully vaccinated. Evidence-based practices such as provider reminders and standing orders can help implement these standards and reduce missed opportunities for vaccination.

Acknowledgment

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Conflict of Interest

No conflicts of interest were reported.

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References

1. Rasmussen SA, Jamieson DJ, Uyeki TM. Effects of influenza on pregnant women and infants. Am J Obstet Gynecol 2012;207(3 Suppl):S3–8.
2. Grohskopf LA, Sokolow LZ, Broder KR, et al. Prevention and control of influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), United States, 2016–17 influenza season. MMWR Recomm Rep 2016;65(No. RR-05). https://doi.org/10.15585/mmwr.rr6505a1
3. Ding H, Black CL, Ball S, et al. Influenza vaccination coverage among pregnant women—United States, 2014–15 influenza season. MMWR Morb Mortal Wkly Rep 2015;64:1000–5. https://doi.org/10.15585/mmwr.mm6436a2
4. Orenstein WA, Gellin BG, Beigi RH, et al.; National Vaccine Advisory Committee. Recommendations from the National Vaccine Advisory committee: standards for adult immunization practice. Public Health Rep 2014;129:115–23. https://doi.org/10.1177/003335491412900203
5. Stark LM, Power ML, Turrentine M, et al. Influenza vaccination among pregnant women: patient beliefs and medical provider practices. Infect Dis Obstet Gynecol 2016;2016:3281975. https://www.hindawi.com/journals/idog/2016/3281975/2016.
6. Ahluwalia IB, Ding H, Harrison L, D'Angelo D, Singleton JA, Bridges C; Pregnancy Risk Assessment Monitoring System Influenza Working Group. Disparities in influenza vaccination coverage among women with live-born infants: PRAMS surveillance during the 2009–2010 influenza season. Public Health Rep 2014;129:408–16. https://doi.org/10.1177/003335491412900504
7. Lindley MC, Wortley PM, Winston CA, Bardenheier BH. The role of attitudes in understanding disparities in adult influenza vaccination. Am J Prev Med 2006;31:281–5. https://doi.org/10.1016/j.amepre.2006.06.025
8. Koepke R, Kahn D, Petit AB, et al. Pertussis and influenza vaccination among insured pregnant women—Wisconsin, 2013–2014. MMWR Morb Mortal Wkly Rep 2015;64:746–50.
9. Kennedy ED, Ahluwalia IB, Ding H, Lu P-J, Singleton JA, Bridges CB. Monitoring seasonal influenza vaccination coverage among pregnant women in the United States. Am J Obstet Gynecol 2012;207(Suppl):S9–16. https://doi.org/10.1016/j.ajog.2012.06.069
10. Mazzoni SE, Brewer SE, Pyrzanowski JL, et al. Effect of a multi-modal intervention on immunization rates in obstetrics and gynecology clinics. Am J Obstet Gynecol 2016;214:617.e1–7. https://doi.org/10.1016/j.ajog.2015.11.018

Evaluation of the Impact of Mandating Health Care Providers to Offer Hepatitis C Virus Screening to All Persons Born During 1945–1965 — New York, 2014

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Approximately 75% of all hepatitis C virus (HCV) infections in the United States and 73% of HCV-associated mortality occur in persons born during 1945–1965, placing this birth cohort at increased risk for liver cancer and other HCV-related liver disease (*1*). In the United States, an estimated 2.7 million persons are living with HCV infection, and it is estimated that up to 75% of these persons do not know their status. Since 2012, CDC has recommended that persons born during 1945–1965 receive one-time HCV testing. To increase the number of persons tested for HCV and to ensure timely diagnosis and linkage to care, in 2014, New York enacted a hepatitis C testing law that requires health care providers to offer HCV antibody screening to all persons born during 1945–1965 who are receiving services in primary care settings or as hospital inpatients, and to refer persons with positive HCV antibody tests for follow-up health care, including an HCV diagnostic test (i.e., HCV RNA).* The New York State Department of Health (NYSDOH) used survey data from clinical laboratories and Medicaid claims and encounter data, and state and New York City (NYC) HCV surveillance data to assess the number of persons tested for HCV and number of persons with newly diagnosed HCV infections who were linked to care. During the first year of the HCV law implementation, there was a 51% increase in specimens submitted for HCV testing to surveyed clinical laboratories; testing rates among active Medicaid clients increased 52%, and linkage to care among persons with newly diagnosed HCV infection increased approximately 40% in New York and 11% in NYC. These findings highlight the potential for state laws to promote HCV testing and the utility of HCV surveillance and Medicaid claims data to monitor the quality of HCV testing and linkage to care for HCV-infected persons.

Before the law's effective date (January 1, 2014), NYSDOH conducted activities to inform providers of the new law, including issuing a provider letter, conducting regional stakeholder meetings and a statewide webinar, and hosting briefings with existing councils and task forces. A frequently asked questions (FAQ) document was also developed and disseminated widely.

To assess the number of persons screened for HCV infection before and after implementation of the HCV testing law in 2014, a survey of clinical laboratories was conducted. Monthly counts of specimens collected from January 2013 through December 2014 for HCV testing from persons born during 1945–1965 were requested from 163 laboratories holding NYSDOH Clinical Laboratory Evaluation Program permits for HCV testing. Twelve (7.4%) laboratories did not meet eligibility requirements† and were excluded from the evaluation.

In addition to the laboratory survey, New York Medicaid data were used to assess trends in HCV testing before and after implementation of the law. Deidentified Medicaid claims and encounter data were used to create monthly denominators for the entire Medicaid population over a 3-year period (January 2012 through December 2014). Only Medicaid recipients born between 1945 and 1965 (aged 50–70 years in 2015) receiving paid services during a given month during the study period (active Medicaid clients) were included in this analysis. Rates of HCV testing per 1,000 Medicaid recipients were calculated based on the number of persons for whom HCV testing procedure codes (current procedural terminology [CPT]) were billed.§ Medicaid recipient records were deduplicated within each month to reflect only one test per person per month. Records were not deduplicated across months.

To assess linkage to care after implementation of the law, NYSDOH and NYC Department of Health and Mental Hygiene HCV surveillance data were reviewed. The proportions of nonincarcerated persons born during 1945–1965 with newly diagnosed cases of confirmed HCV infection (*2*) who were linked to care during the preenactment period (January 2011–December 2013) and the postenactment period (January 2014–December 2014) were compared. Linkage to care was defined as documentation of either 1) two or more positive HCV RNA tests (excluding reflex RNA testing) or 2) one positive HCV RNA test (excluding reflex RNA testing) and an HCV genotype test within 6 months of the initial positive HCV antibody result. In reflex RNA testing, a positive antibody test result triggers an automatic RNA test by the laboratory on the same specimen. For this analysis, reflex testing was defined as an HCV RNA test with the same

* Required Offering of Hepatitis C Screening Testing, NY Pub Health L § 2171 (January 1, 2014). http://law.justia.com/codes/new-york/2014/pbh/article-21/title-7/2171/.

† Laboratories that only test specimens for clinical trials, end-stage renal disease, or tissue/organ donations, and laboratories that were unable to report data by birth cohort or residence, were not eligible for participation.

§ Current procedural terminology (CPT) codes 86803 or 86804 (hepatitis C antibody or hepatitis C antibody; confirmatory test (eg, immunoblot)).

collection date as the HCV antibody test. The rationale for excluding reflex testing is that a reflex RNA test is automatic and does not necessarily indicate an engagement in care. These laboratory data were made available through the Electronic Clinical Laboratory Reporting System. Linkage to care was assessed among active Medicaid clients receiving Medicaid services statewide. Among Medicaid recipients receiving HCV antibody testing, those who also received RNA testing[¶] during the same year they were initially tested were considered linked to care; because Medicaid claims data do not distinguish reflex testing, these results might include reflex testing.

Among the 151 laboratories eligible for the survey, 116 (76.8%) responded, 106 (91.4%) of which provided 24 months of usable data for analysis. Among laboratories that provided 24 months of data, the monthly rates of increase for 2013 (preenactment) and 2014 (postenactment) were assessed by fitting two linear trend lines to the 2013 and 2014 monthly data, respectively.

[¶] RNA test codes defined as follows: 87520 = infectious agent detection by nucleic acid (DNA or RNA); hepatitis C, direct probe technique; 87521 = infectious agent detection by nucleic acid (DNA or RNA); hepatitis C, reverse transcription and amplified probe technique; 87522 = infectious agent detection by nucleic acid (DNA or RNA); hepatitis C, reverse transcription and quantification.

Data from the 106 responding laboratories that provided 24 months of data indicated a 51.1% increase in the number of specimens collected for HCV testing from persons born during 1945–1965, from 538,229 in 2013 to 813,492 in 2014 (Figure 1). During 2013, the average rate of increase was approximately 404 specimens per month. In 2014, the average rate of increase was 1,091 specimens per month.

New York Medicaid data from 2012 to 2014 also demonstrated an increase in HCV testing. Before the law was enacted, the average monthly HCV testing rate for persons born during 1945–1965 was 8.4 per 1,000 active Medicaid clients in 2012 and 8.8 in 2013. After enactment of the law in January 2014, the average monthly HCV testing rate rose to 12.8 per 1,000, representing a 52% increase in the average monthly testing rate from 2012 to 2014 (Figure 2). In contrast, the monthly rate of HCV testing increased only slightly among active Medicaid clients born before 1945 or after 1965, from 4.5 per 1,000 active clients during 2012 to 4.8 in 2013 and 5.6 in 2014, an overall 24% increase in the average monthly testing rate.

Analysis of HCV surveillance data indicated a 39.8% increase (from 24.1% to 33.7%) in the percentage of persons with newly diagnosed HCV infection who were linked to care

FIGURE 1. Number of specimens collected for Hepatitis C virus testing from persons born during 1945–1965 by participating clinical laboratories holding New York Clinical Laboratory Evaluation Program permits (N = 106) — New York, January 2013–December 2014

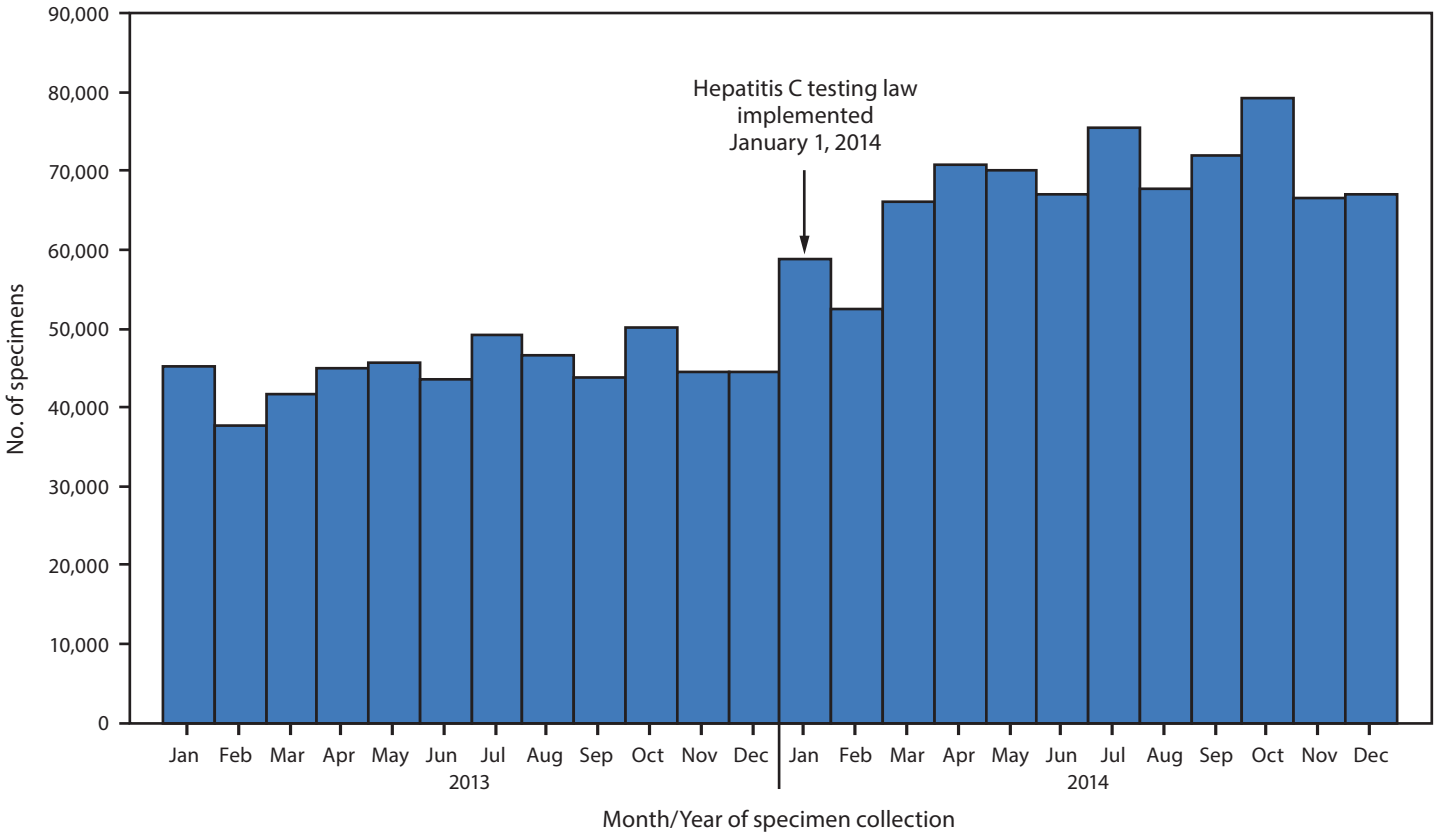
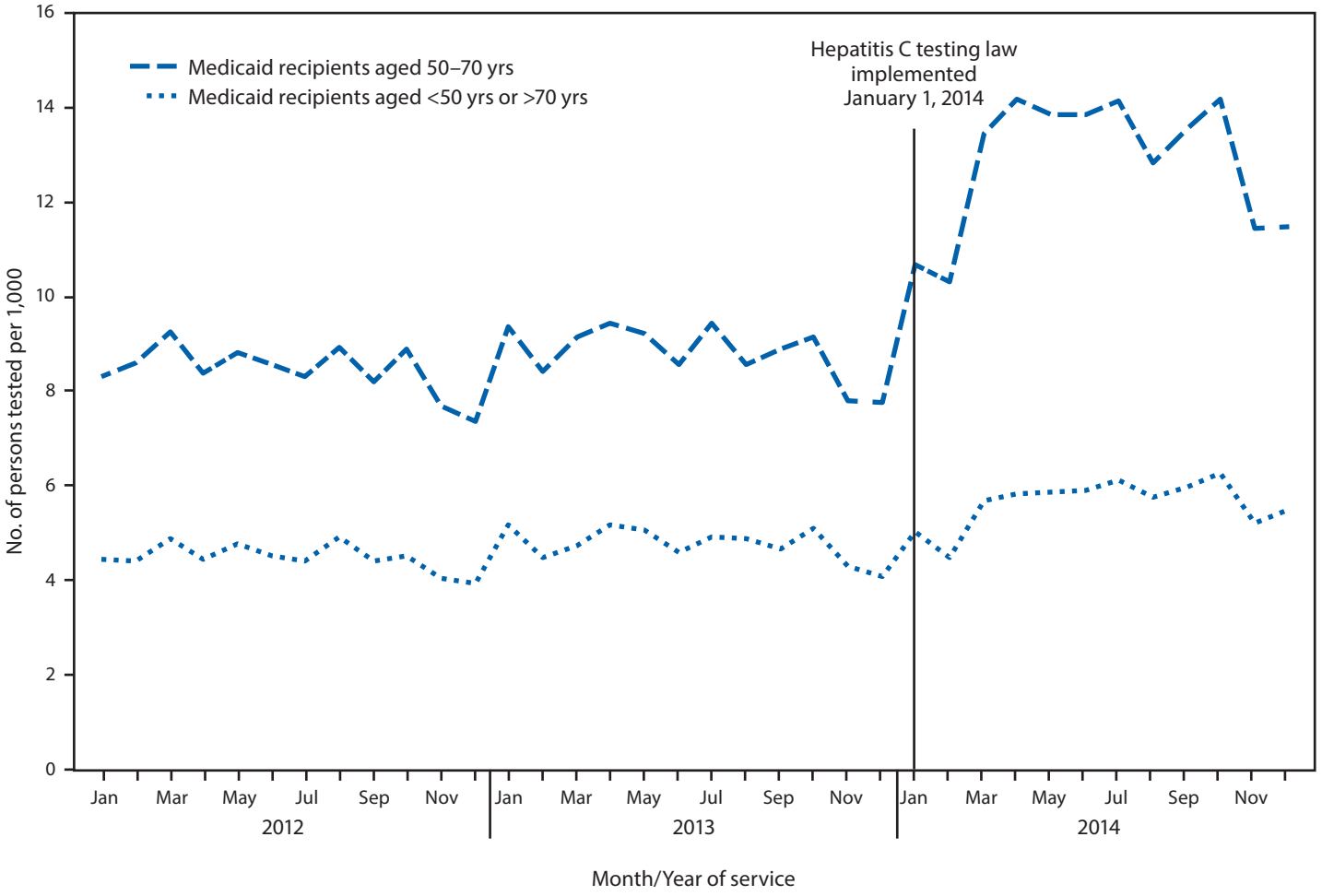


FIGURE 2. Rate of Hepatitis C virus testing* per 1,000 Medicaid recipients, by age cohort — New York, 2012–2014



* Procedure Codes 86803 and 86804.

in New York, and an 11.2% increase (from 19.5% to 21.7%) in NYC during 2014 (after enactment of the law) compared with 2011–2013. Medicaid data indicated an overall rate increase of 35% from 13,839 to 18,614 between 2013 and 2014.

Discussion

Implementation of the New York law mandating health care providers to offer HCV testing to persons born during 1945–1965 was associated with an increase in HCV testing, and an increase in the percentage of persons with newly diagnosed HCV infections who were linked to care. Marked increases in the number of HCV tests performed and rates of testing were observed immediately after enactment of the law and remained steady over a 12-month period. Smaller increases were noted in the number of persons who accessed care after receiving a positive HCV screening test result.

The use of multiple and complementary data sources in the evaluation was necessary to document the changes in HCV screening and linkage to care since enactment of the law. For instance, determining the extent of HCV screening and linkage to care in New York was not possible through examination of surveillance data alone because reporting of negative test results was not required at the time of the evaluation. The use of laboratory survey data provided a simple and direct way to assess the relative changes in the number of HCV screening specimens tested over a 24-month period. The use of Medicaid claim and encounter data complemented the findings from the laboratory survey by allowing a comparison of HCV testing rates among persons born during 1945–1965 with rates among persons born before 1945 and after 1965. The sharp rise in the testing rate among New York active Medicaid clients aged 50–70 years after implementation of the testing law contrasted with the more gradual increase in HCV screening rates among younger and older Medicaid clients for whom the law does not apply.

The findings in this report are subject to at least five limitations. First, the use of observational data did not allow for controlling for all the possible factors that might have contributed to the observed increases. For example, the reasons for the gradual increase in HCV testing in the year before the law was implemented that were identified by the laboratory survey are not known, but the gradual increase might have been affected by educational efforts around the recommendation for screening of persons in this age group and increased awareness of the CDC recommendation, and an increase in general HCV awareness. Second, although response rates from the participating laboratories were high (77%), the findings are based on only those laboratories that responded to the inquiry and might not be representative of all laboratories. Third, there is no standardized or universally accepted indicator for linkage to care, and the proxies developed for the analysis of surveillance and Medicaid data have not been independently validated. Fourth, laboratories were required to report only positive HCV RNA test results during the evaluation period; therefore, persons whose HCV RNA test results were negative, but who were linked to care were not included in the analysis, possibly resulting in underascertainment. Finally, limited capacity for HCV care and treatment, especially among HCV specialists, might have negatively affected timely linkage to care. In some areas of the state, wait times for appointments can exceed 6 months. Limited resources for conducting active linkage to care might also have also negatively influenced rates.

With availability of new HCV therapies that can stop disease progression and result in a virologic cure for >90% of HCV-infected persons, testing and linkage to care for HCV-infected persons in this birth cohort are expected to reduce HCV-related morbidity and mortality and decrease deaths from liver cancer (*1*). During the first year of the law's implementation, HCV treatments were available through the New York Medicaid Program (i.e., fee-for-service). However, prior authorization was required and disease severity restrictions were enforced.** On April 27, 2016, those disease severity restrictions were eliminated, allowing greater access to treatment. This report highlights the potential for state laws to promote HCV testing and the utility of HCV surveillance and Medicaid claims data to monitor the quality of HCV testing and linkage to care for HCV-infected persons.

** HCV treatment was restricted to persons with advanced liver disease (evidence of stage 3 or 4 hepatic fibrosis).

Summary

What is already known about this topic?

Persons born during 1945–1965 account for approximately 75% of all hepatitis C virus (HCV) infections in the United States and 73% of HCV-associated mortality. Most infected persons do not know their status. In January 2014, New York became the first state to enact an HCV testing law, which is expected to increase the number of persons who are aware of their HCV status.

What is added by this report?

One year after implementation of the 2014 New York HCV Testing Law, marked increases were observed in the number of HCV screening tests and rates of testing. Increases were observed almost immediately after enactment of the law and remained steady at levels substantially higher than those in the years preceding enactment of the law. Smaller increases were noted in the number of persons who accessed HCV care following a positive HCV screening test.

What are the implications for public health practice?

State-level HCV testing laws could increase the number of persons who know their HCV status and of HCV-infected persons who are linked to care. With the availability of new therapies that can stop disease progression and provide a cure in most persons, testing and linkage to care for infected persons is likely to reduce HCV-related morbidity and liver cancer-associated mortality.

Conflict of Interest

No conflicts of interest were reported.

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References

1. Smith BD, Morgan RL, Beckett GA, et al. Recommendations for the identification of chronic hepatitis C virus infection among persons born during 1945–1965. MMWR Recomm Rep 2012;61(No. RR-4).
2. CDC. Hepatitis C, past or present. 2012 case definition. CSTE position statement(s). Atlanta, GA: US Department of Health and Human Services, CDC; 2012. https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-chronic/case-definition/2012/

Notes from the Field

Outbreak of *Campylobacter jejuni* Associated with Consuming Undercooked Chicken Liver Mousse — Clark County, Washington, 2016

Derel Glashower, MPH[1]; Jennifer Snyder[1]; Diane Welch, MS[1]; Shannon McCarthy[1]

On July 13, 2016, Clark County (Washington) Public Health (CCPH) received a report of diarrheal illness in four of seven members of a single party who dined at a local restaurant on July 6, 2016. The report was received through an online/telephone system for reporting food service–associated illness complaints. Members of the five households in the party reported that their only shared exposure was the restaurant meal. CCPH ordered closure of the restaurant kitchen on July 13, 2016, and began an investigation to identify the source of diarrheal illness and implement additional control measures.

CCPH defined a probable case of restaurant-associated illness as diarrhea lasting >2 days in any restaurant guest or staff member with illness onset from July 1, 2016, to July 23, 2016. After *Campylobacter jejuni* was cultured from stool specimens submitted by three ill members of the dining party, a confirmed case was defined as culture evidence of *C. jejuni* infection in any restaurant guest or staff member with onset of diarrheal illness during the same period. Five cases (three confirmed and two probable) were identified, four in restaurant guests and one in a food worker; patient age ranged from 27–46 years; three patients were female.

CCPH conducted a case-control study involving 28 menu items, using 14 non-ill dining companions and restaurant staff members as controls. Consumption of two menu items, chicken liver mousse (odds ratio [OR] = 36.1, 95% confidence interval [CI] = 1.58–828.9), and grilled romaine hearts (OR = 18, 95% CI = 1.19–271.5) were associated with case status. Because of the higher odds ratio of chicken liver mousse and previous *Campylobacter* outbreaks associated with chicken livers (*1*,*2*), the investigation focused on the mousse.

During an inspection on July 15, the sous-chef solely responsible for preparing the chicken liver mousse demonstrated preparation to the CCPH food safety inspector, who observed that the sous-chef used the appearance of the livers alone to determine whether they were fully cooked. Final internal cook temperature of the largest liver measured by the inspector was <130°F (54°C), below the minimum 165°F (74°C) internal temperature deemed necessary by the Food and Drug Administration to eliminate food safety hazards (*3*). Because raw chicken parts are not required to be free of *Campylobacter* (*4*), and the bacteria might be present on the surface of 77% of retail chicken livers (*5*), CCPH immediately addressed undercooking of the livers.

One patient stool specimen isolate was available for typing by pulsed-field gel electrophoresis (PFGE). The PFGE pattern from this isolate was indistinguishable from those obtained from two chicken liver samples collected in a 2014 campylobacteriosis outbreak in Oregon (*1*). Chicken livers associated with both the 2014 outbreak and with this outbreak were supplied by the same company. Chicken livers from the lot served at the restaurant on the day of the implicated meal were no longer available; therefore, the U.S. Department of Agriculture could not pursue testing of chicken liver samples.

Among published *C. jejuni* outbreaks associated with undercooked chicken livers, this outbreak report is the second from the Pacific Northwest (*1*), and the first in the United States initially reported through an illness complaint system. Because CCPH does not actively investigate *Campylobacter* cases in persons aged >5 years, and because *Campylobacter* PFGE is not routinely conducted in Washington, this outbreak would have likely gone undetected if not for the illness complaint system, demonstrating the value of illness complaint investigations to identify outbreaks and mitigate public health risks.

Acknowledgments

Jeff Sogo, Joe Laxson, Monica Czapla, Alan Melnick, Clark County Public Health, Vancouver, Washington; Beth Melius, Kaye Eckmann, Washington State Department of Health.

Conflict of Interest

No conflicts of interest were reported.

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References

1. Scott MK, Geissler A, Poissant T, et al. Notes from the field: campylobacteriosis outbreak associated with consuming undercooked chicken liver pâté—Ohio and Oregon, December 2013–January 2014. MMWR Morb Mortal Wkly Rep 2015;64:399.
2. CDC. Multistate outbreak of *Campylobacter jejuni* infections associated with undercooked chicken livers—northeastern United States, 2012. MMWR Morb Mortal Wkly Rep 2013;62:874–6.
3. Food and Drug Administration. Food code 2013. Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2013. https://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm374275.htm
4. Food Safety and Inspection Service. Giblets and food safety. Washington, DC: US Department of Agriculture, Food Safety and Inspection Service; 2013. https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/poultry-preparation/giblets-and-food-safety/ct_index
5. Noormohamed A, Fakhr MK. Incidence and antimicrobial resistance profiling of *Campylobacter* in retail chicken livers and gizzards. Foodborne Pathog Dis 2012;9:617–24. https://doi.org/10.1089/fpd.2011.1074

Announcement

Final 2016–17 Influenza Vaccination Coverage Estimates Available Online

Final 2016–17 influenza season vaccination coverage estimates for selected local areas, states, U.S. Department of Health and Human Services regions, and the United States overall are available online at FluVaxView (https://www.cdc.gov/flu/fluvaxview/). The online information includes estimates of the cumulative percentage of persons receiving influenza vaccination through the end of each month during July 2016–May 2017.

Analyses were conducted using National Immunization Survey–Flu influenza vaccination data for children aged 6 months–17 years and Behavioral Risk Factor Surveillance System influenza vaccination data for adults aged ≥18 years. Estimates are provided by age group and race/ethnicity. These estimates are presented in interactive reports (https://www.cdc.gov/flu/fluvaxview/interactive.htm) and are complemented by an online summary report (http://www.cdc.gov/flu/fluvaxview/coverage-1617estimates.htm).

Notice to Readers

New Web Location for Annual and Weekly NNDSS Data

To improve the usability, availability, quality, and timeliness of surveillance data (*1*) as part of the CDC Surveillance Strategy, CDC will provide users with a convenient way to access notifiable infectious and noninfectious disease data through the National Notifiable Diseases Surveillance System (NNDSS) website.

CDC has redesigned the data and statistics section of the NNDSS website to be a one-stop shop for users to find both detailed information about notifiable disease data and links to the annual and weekly data. Although these data will no longer be published in their current format in *MMWR*, users can easily access the information through the NNDSS website. To ease the transition, *MMWR* also will link users from its website to the new location on the NNDSS website.

Annual Reporting

CDC expects to transition the reporting of NNDSS annual data in November 2017. The redesigned NNDSS Data and Statistics webpage at https://wwwn.cdc.gov/nndss/data-and-statistics.html will contain links to infectious disease data tables that are available in HTML, text, and PDF formats and hosted on the CDC WONDER (*2*) platform. The webpage also will provide links to noninfectious condition and disease outbreak surveillance reports published by CDC programs and hosted on CDC WONDER. In addition, the webpage will provide the following resources: 1) documentation for NNDSS infectious diseases and noninfectious conditions and disease outbreaks, including how the data are collected, reported, and finalized; 2) publication criteria; 3) notes about interpreting data; and 4) the list of notifiable conditions by year.

Weekly Reporting

CDC expects to transition the reporting of NNDSS weekly data in January 2018 and will provide more information later this year.

Consolidating the notifiable disease data on the NNDSS website is part of the NNDSS Modernization Initiative (NMI) strategy to streamline NNDSS and access to data for users; NMI is a component of the CDC Surveillance Strategy. This consolidation of information also is in response to the recommendations of a workgroup consisting of representatives from the CDC Excellence in Science Committee, the Surveillance Science Advisory Group, and *MMWR*, to make more data available online and to allow *MMWR* to focus on publishing scientific and actionable surveillance reports.

Reference

1. Richards CL, Iademarco MF, Anderson TC. A new strategy for public health surveillance at CDC: improving national surveillance activities and outcomes. Public Health Rep 2014;129:472–6. https://doi.org/10.1177/003335491412900603
2. CDC. CDC WONDER. Atlanta, GA: US Department of Health and Human Services, CDC; 2017. https://wonder.cdc.gov/

Errata

Vol. 66 No. 34

In the report, "Notes from the Field: Lead Poisoning in an Infant Associated with a Metal Bracelet — Connecticut, 2016" on page 916, the second paragraph should have read "The parents reported that the child intermittently wore a handmade "homeopathic magnetic hematite healing bracelet" that they had purchased from an artisan at a local fair (Figure). **The bracelet was described as "homeopathic," but homeopathic products are, by definition, regulated drugs and so nondrug items, such as bracelets, cannot be homeopathic. Cases of mislabeled products, especially among homemade items, should raise suspicion for consumers and health care professionals.** The child wore the bracelet for teething related discomfort and was sometimes noted to chew on it. Small spacer beads from the bracelet tested at the Manchester Health Department were positive for lead (17,000 ppm). No identifying marks indicating metal content or manufacturer were found on the bead. The vendor records were not available, and the bracelet maker could not be located."

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In the report, "Overdose Deaths Related to Fentanyl and Its Analogs — Ohio, January–February 2017," on page 904, the sixth sentence of the first paragraph should have read "The Wright State University and the Montgomery County Coroner's Office/Miami Valley Regional Crime Laboratory (MCCO/MVRCL) collaborated on a National Institutes of Health study of fentanyl analogs and metabolites and other drugs identified in 281 unintentional overdose fatalities in **25** Ohio counties during January–February 2017."

On page 904 the second sentence of the second paragraph should have read "Data from 281 unintentional overdose fatalities that occurred in Montgomery County and **24** additional counties[†] during January and February 2017, were analyzed by the MCCO Toxicology laboratory, and had assigned causes of death as of May 8, 2017, were included in this study."

On page 905, under "What is added by this report?" the first sentence should have read "Approximately 90% of unintentional overdose deaths examined in **25** Ohio counties that occurred during January–February 2017 involved fentanyl, fentanyl analogs, or both, whereas heroin was identified in the minority (6%) of cases, with somewhat higher prevalence in Appalachian counties."

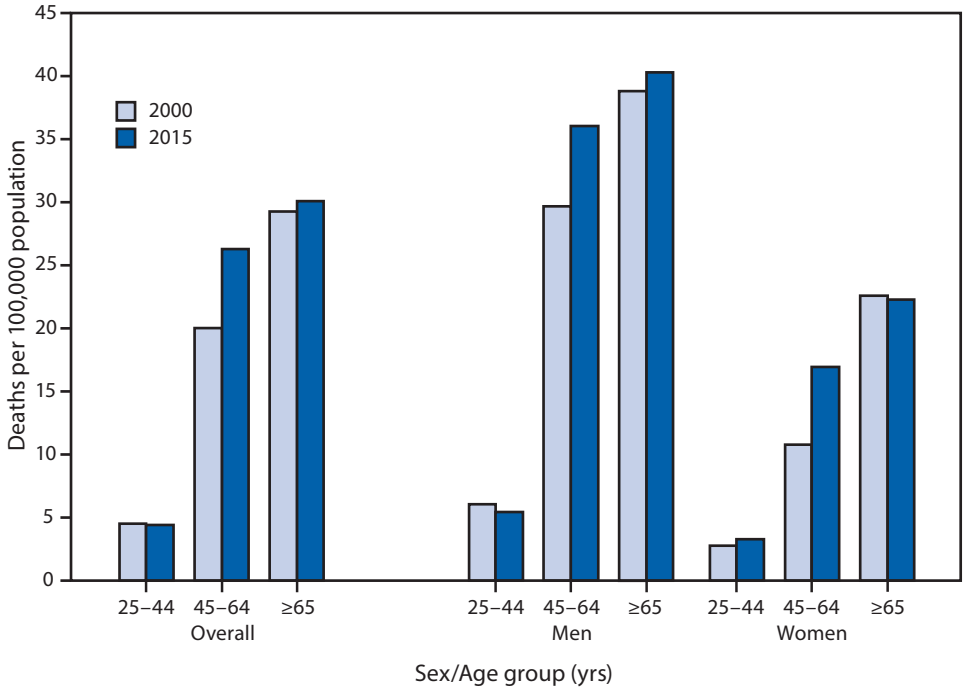
On page 907, the second sentence of the first paragraph should have read "Approximately 90% of unintentional overdose deaths in **25** Ohio counties that occurred during January and February 2017 involved fentanyl, fentanyl analogs, or both.

On page 907, the last sentence of the third paragraph should have read "Finally, data were obtained from **25** Ohio counties, and findings might not be generalizable to the entire state."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Death Rates* for Chronic Liver Disease and Cirrhosis,† by Sex and Age Group — National Vital Statistics System, United States, 2000 and 2015



* Rates per 100,000 population.
† Chronic liver disease and cirrhosis deaths were identified with *International Classification of Diseases, Tenth Revision* (ICD-10) codes K70 and K73–K74.

From 2000 to 2015, death rates for chronic liver disease and cirrhosis in the United States increased 31% (from 20.1 per 100,000 to 26.4) among persons aged 45–64 years. Rates in that age group increased 21% for men (from 29.8 to 36.2) and 57% for women (from 10.8 to 17.0). Among persons aged 25–44 years, the death rate for men decreased 10% (from 6.1 to 5.5), and the rate for women increased 18% (from 2.8 to 3.3). Overall, among persons aged ≥65 years, rates increased 3% (from 29.4 to 30.2). Death rates for both men and women increased with age.

Source: National Vital Statistics System, mortality data. https://www.cdc.gov/nchs/nvss/deaths.htm.

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