Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 64 / No. 42
October 30, 2015

Human Papillomavirus Vaccination Coverage Among Female Adolescents in Managed Care Plans — United States, 2013

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Human papillomavirus (HPV) is the most common sexually transmitted infection, with a reported 79 million persons aged 15–59 years in the United States currently infected with HPV, and approximately 14 million new cases diagnosed each year (*1*). Although most HPV infections are asymptomatic, transient, and do not cause disease (*1*), persistent HPV infection can lead to cervical, vulvar, vaginal, anal, penile, and oropharyngeal cancer. In the United States, approximately 27,000 HPV-attributable cancers occur each year (*2*). HPV vaccination is an effective primary prevention strategy that can reduce many of the HPV infections that lead to cancer (*3*), and is routinely recommended for adolescents aged 11–12 years. To determine whether the recommended HPV vaccination series is currently being administered to adolescents with health insurance, CDC and the National Committee for Quality Assurance (NCQA) assessed 2013 data from the Healthcare Effectiveness Data and Information Set (HEDIS). The HEDIS HPV Vaccine for Female Adolescents performance measure evaluates the proportion of female adolescent members in commercial and Medicaid health plans who receive the recommended 3-dose HPV vaccination series by age 13 years. In 2013, in the United States, the median HPV vaccination coverage levels for female adolescents among commercial and Medicaid plans were 12% and 19%, respectively (ranges = 0%–34% for commercial plans; 5%–52% for Medicaid plans). Improving HPV vaccination coverage and understanding of what health plans might do to support HPV vaccination are needed, including understanding the barriers to, and facilitators for, vaccination coverage.

HEDIS measures, developed by NCQA to assess quality of care in health plans, are reported by two thirds of all U.S. health plans and represent three fourths of the U.S. population receiving managed care (*4*). Because of differences in the populations and insurance coverage, HEDIS results are usually reported separately for three different plan categories: commercial, Medicaid and Medicare. Because of differences in how health maintenance organizations (HMOs) and preferred provider organizations (PPOs) collect some data, NCQA further stratifies results by reporting plan type. This study reports national and regional 2013 results, stratified by plan category and type.

The HEDIS HPV Vaccine for Female Adolescents measure assesses plan performance by examining the percentage of female adolescent plan members aged 13 years who had received 3 doses of HPV vaccine by their 13th birthday. The measure follows CDC recommendations for HPV vaccination (*3*). Only commercial and Medicaid plans report this measure (Medicare plans primarily enroll older adults and are

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thus not included in this measure). Among commercial plans, both HMOs and PPOs report this measure; among Medicaid plans, only HMOs report this measure (i.e., no Medicaid PPOs report this measure). The denominator for the HPV vaccination measure consists of all female adolescent plan members aged 13 years continuously enrolled in their plan for the 12 months before their 13th birthday (for commercial members, no more than one gap in enrollment of up to 45 days during the 12 months preceding the 13th birthday is allowed; for Medicaid members, whose enrollment is verified monthly, no more than a 1-month gap in coverage is allowed). The numerator is the population in the denominator who received 3 doses of HPV vaccine, with different dates of service on or between the member's ninth and 13th birthdays. Exclusions from the denominator are allowed if the member has had an anaphylactic reaction to an HPV vaccine or its components at any time on or before the member's 13th birthday. Results are reported at the plan level and expressed as percentages.

In 2013, 367 commercial plans and 153 Medicaid plans submitted HEDIS HPV vaccination measure data, representing a total of 626,318 female adolescent plan members, aged 13 years, eligible for the measure (approximately 31% of the U.S. female population aged 13 years*). Health plan performance rates varied by plan type, but overall remained low (Table 1). Commercial plans provided 3 doses of HPV vaccine to a median of 12% of female adolescent members by age 13 years. Little variation in performance among commercial plans was found, with a <15 percentage point difference separating the 10th and 90th percentile of performance distribution.

Medicaid plans reported significantly higher rates of 3-dose HPV coverage compared with commercial plans, with a median of 19% of female adolescents receiving 3 doses. Medicaid plans also reported slightly more variation in range of performance (>20 percentage point difference between the 10th and 90th percentile of performance). The highest performance rate for a commercial plan was 34%, whereas the highest rate for a Medicaid plan was 52%.

Performance varied by U.S. Health and Human Services (HHS) region. The majority of highest-performing commercial plans (Table 2) or Medicaid plans (Table 3) were from the Chicago, Philadelphia, and San Francisco HHS regions (HHS regions 5, 3, and 9, respectively). Little difference in performance by plan size was found and all highest-performing plans were HMOs.

Discussion

Most female adolescents in commercial and Medicaid health plans are currently not receiving the recommended doses of HPV vaccine by age 13 years. The HEDIS HPV vaccination measure was publicly reported for the first time in 2013, approximately 7 years after the quadrivalent HPV vaccine was licensed in the United States and recommended by the

* U.S. Census Bureau annual estimates of the resident population by single year of age and sex, April 1, 2010 to July 1, 2014. Available at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

The *MMWR* series of publications is published by the Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30329-4027.

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2015;64:[inclusive page numbers].

Advisory Committee on Immunization Practices (ACIP) for use in female adolescents (*4*), allowing health care providers time to adapt to the recommendations. Despite this, results from this study indicate that health plans are performing poorly overall with regard to HPV vaccination rates in female adolescents aged 13 years.

TABLE 1. Human papillomavirus (HPV) vaccination rates among female adolescent health plan members, by plan category and type — Healthcare Effectiveness Data and Information Set (HEDIS), United States, 2013

			Plan performance percentile* (%)						
Plan category	Plan type	No. of plans	Minimum	10th	25th	50th	75th	90th	Maximum
Commercial	**All**	**367**	**0.0**	**7.3**	**9.1**	**11.7**	**15.3**	**20.0**	**33.8**
	HMO	187	3.2	8.0	10.3	13.4	17.3	22.1	33.8
	PPO	180	0.0	6.7	8.5	10.4	13.0	16.3	22.6
Medicaid	**All (HMO only)**	**153**	**4.7**	**10.9**	**15.3**	**19.2†**	**23.6**	**28.9**	**52.3**

Abbreviations: HMO = health maintenance organization; PPO = preferred provider organization.
* The percentage of female adolescents aged 13 years who had received 3 doses of HPV vaccine by their 13th birthday.
† Significantly different from commercial plans (p<0.001).

TABLE 2. Human papillomavirus (HPV) vaccination rates among female adolescent members in commercial health plans, by HHS region and plan type — Healthcare Effectiveness Data and Information Set (HEDIS), United States,* 2013

			Plan performance percentile† (%)						
HHS region number (HQ city)§,¶	Plan type	No. of plans	Minimum	10th	25th	50th	75th	90th	Maximum
1 (Boston)	**All**	**39**	**6.9**	**8.4**	**10.0**	**12.7**	**16.7**	**20.8**	**22.6**
	HMO	22	6.9	8.9	10.6	12.6	16.0	17.5	20.8
	PPO	17	7.9	8.4	9.1	12.9	19.5	22.4	22.6
2 (New York)	**All**	**31**	**5.7**	**6.3**	**7.2**	**8.8**	**12.6**	**17.0**	**20.4**
	HMO	18	6.3	6.8	8.0	11.0	16.6	18.4	20.4
	PPO	13	5.7	5.8	6.7	7.3	8.7	12.4	14.8
3 (Philadelphia)	**All**	**54**	**0.0**	**8.5**	**10.3**	**13.3**	**16.9**	**20.7**	**26.3**
	HMO	31	6.9	9.1	10.5	13.6	17.5	21.7	26.3
	PPO	23	0.0	8.5	9.5	12.3	14.2	19.2	20.2
4 (Atlanta)	**All**	**59**	**5.4**	**6.7**	**8.5**	**9.7**	**11.5**	**14.1**	**24.3**
	HMO	27	5.8	7.5	8.2	10.3	13.1	19.4	24.3
	PPO	32	5.4	6.3	8.5	9.5	10.8	12.0	15.3
5 (Chicago)	**All**	**75**	**5.4**	**8.7**	**10.4**	**12.0**	**16.1**	**20.0**	**26.3**
	HMO	45	5.4	9.5	11.5	13.6	17.0	22.5	26.3
	PPO	30	7.0	7.8	9.3	10.8	11.9	13.6	17.6
6 (Dallas)	**All**	**36**	**3.2**	**5.8**	**7.6**	**9.8**	**12.0**	**14.7**	**17.1**
	HMO	21	3.2	5.5	8.6	10.7	14.4	14.9	17.1
	PPO	15	6.6	7.1	7.5	9.0	10.2	10.6	13.0
7 (Kansas City)	**All**	**32**	**5.4**	**6.2**	**7.2**	**10.3**	**13.0**	**16.2**	**21.9**
	HMO	15	5.4	5.9	9.4	10.8	14.1	16.2	21.9
	PPO	17	6.2	6.3	6.7	9.4	11.7	16.2	17.4
8 (Denver)	**All**	**28**	**3.2**	**5.5**	**10.1**	**11.3**	**15.4**	**20.8**	**27.1**
	HMO	16	3.2	10.0	10.7	12.2	19.1	22.1	27.1
	PPO	12	3.6	5.5	6.2	10.3	11.8	14.8	14.9
9 (San Francisco)	**All**	**39**	**5.8**	**7.8**	**10.2**	**12.8**	**17.1**	**23.8**	**33.8**
	HMO	22	5.8	9.0	14.0	16.7	21.5	25.4	33.8
	PPO	17	7.2	7.4	9.3	11.2	11.8	13.9	16.3
10 (Seattle)	**All**	**26**	**7.4**	**9.5**	**10.7**	**14.1**	**16.8**	**20.8**	**23.8**
	HMO	6	11.4	11.4	15.8	19.7	21.4	23.8	23.8
	PPO	20	7.4	9.0	10.5	13.5	14.7	16.8	18.0

Abbreviations: HHS = U.S. Department of Health and Human Services; HMO = health maintenance organization; HQ = headquarters; PPO = preferred provider organization.
* Territories not included.
† The percentage of female adolescents aged 13 years who had received 3 doses of HPV vaccine by their 13th birthday.
§ Listed with headquarters city for each region: *Region 1* (Boston, MA) = Connecticut, Maine, Maryland, Massachusetts, New Hampshire, Rhode Island, Vermont; *Region 2* (New York, NY) = New Jersey, New York; *Region 3* (Philadelphia, PA) = Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia; *Region 4* (Atlanta, GA) = Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee; *Region 5* (Chicago, IL) = Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin; *Region 6* (Dallas, TX) = Arkansas, Louisiana, New Mexico, Oklahoma, Texas; *Region 7* (Kansas City, MO) = Iowa, Kansas, Missouri, Nebraska; *Region 8* (Denver, CO) = Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming; *Region 9* (San Francisco, CA) = Arizona, California, Hawaii, Nevada; *Region 10* (Seattle, WA): Alaska, Idaho, Oregon, Washington.
¶ Individual plans can be associated with multiple HHS regions. Within a given region, all plans associated with that region will contribute to the results for that region. Therefore, regional counts will not necessarily add up to national counts.

TABLE 3. Human papillomavirus (HPV) vaccination rates among female adolescent members in Medicaid health plans,* by HHS region — Healthcare Effectiveness Data and Information Set (HEDIS), United States,† 2013

HHS region (HQ city)¶,**	No. of plans	Plan performance percentile§ (%)						
		Minimum	10th	25th	50th	75th	90th	Maximum
1 (Boston)	8	9.8	9.8	19.0	21.8	27.9	34.3	34.3
2 (New York)	12	10.7	11.9	14.7	18.6	23.5	26.4	31.0
3 (Philadelphia)	23	13.2	16.2	17.7	21.7	26.8	32.9	35.9
4 (Atlanta)	30	4.7	7.4	10.7	16.1	20.4	23.2	29.0
5 (Chicago)	42	6.3	12.0	15.0	18.9	23.5	27.3	48.6
6 (Dallas)	14	6.4	7.2	16.3	19.4	25.6	26.4	28.7
7 (Kansas City)	7	7.9	7.9	14.3	19.1	19.9	26.0	26.0
8 (Denver)	5	13.4	13.4	16.0	16.5	21.3	31.6	31.6
9 (San Francisco)	10	8.8	11.8	17.5	25.3	33.1	47.0	52.3
10 (Seattle)	2	19.6	19.6	19.6	20.2	20.8	20.8	20.8

Abbreviations: HHS = U.S. Department of Health and Human Services; HQ = headquarters.

* All Medicaid plans were health maintenance organizations (HMOs).

† Territories not included.

§ The percentage of female adolescents aged 13 years who had received 3 doses of human papillomavirus (HPV) vaccine by their 13th birthday.

¶ Listed with headquarters city for each region: *Region 1* (Boston, MA) = Connecticut, Maine, Maryland, Massachusetts, New Hampshire, Rhode Island, Vermont; *Region 2* (New York, NY) = New Jersey and New York; *Region 3* (Philadelphia, PA): Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia; *Region 4* (Atlanta, GA) = Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee; *Region 5* (Chicago, IL) = Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin; *Region 6* (Dallas, TX) = Arkansas, Louisiana, New Mexico, Oklahoma, Texas; *Region 7* (Kansas City, MO) = Iowa, Kansas, Missouri, and Nebraska; *Region 8* (Denver, CO): Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming; *Region 9* (San Francisco, CA) = Arizona, California, Hawaii, Nevada; *Region 10* (Seattle, WA) = Alaska, Idaho, Oregon, Washington.

** Individual plans can be associated with multiple HHS regions. Within a given region, all plans associated with that region will contribute to the results for that region. Therefore, regional counts will not necessarily add up to national counts.

In the United States, HPV vaccination coverage has been lower than that observed for other vaccines recommended for adolescents (*5*). Although not directly comparable because of differences in methodology, results from this study suggest lower coverage than estimates from the 2013 National Immunization Survey-Teen (NIS-Teen), which indicated 25.8% (±3.8%) of girls aged 13 years at the time of interview had received 3 HPV vaccine doses (*5*). However, the results from this study that show higher vaccination coverage among Medicaid plans than commercial plans are consistent with findings from the 2011 NIS-Teen that showed that adolescents entitled to receive vaccines through the Vaccines for Children Program because of Medicaid enrollment had substantially higher 3-dose HPV vaccination coverage than did privately insured adolescents (*6*).

Although this analysis is unable to identify reasons that HPV vaccination coverage by age 13 years for insured adolescents is low, studies have identified that clinicians are less likely to make a strong recommendation for HPV vaccination for adolescents aged 11 or 12 years compared with older adolescents (*7*,*8*). Because a clinician recommendation greatly influences parental acceptance (*9*), CDC has developed resources to help clinicians respond to parents' questions and communicate strong, clear HPV vaccination recommendations (available at http://www.cdc.gov/hpv).

The findings in this report are subject to at least five limitations. First, HEDIS data are limited to those persons insured by reporting health plans, and therefore might not be generalizable to other adolescents. Second, HEDIS results could not be adjusted to account for population differences that might affect results (e.g., socioeconomic status and patient or parental health literacy); however, stratified reporting by plan category (commercial versus Medicaid) was meant to address some key population differences. Third, plans can be attributed to multiple HHS regions because of service area overlap; therefore, some larger plans might be overrepresented across multiple regions, potentially minimizing regional differences. Fourth, information regarding parental refusal or concerns about HPV vaccination was not assessed; the availability of this information could have clarified the extent to which lower plan performance rates might have been influenced by parental refusal. Finally, HEDIS reporting is voluntary and not all health plans are required to report on HEDIS measures, including the HPV measure assessed in this study. However, NCQA has estimated that approximately two thirds of health plans reported on the HPV measure in 2013. The 2013 results reflect the first year the HPV measure was publicly reported. The proportion of plans reporting on the measure will likely increase in coming years because the measure was recently added to NCQA's Health Plan Accreditation Program, and now plans seeking accreditation must report the measure.

Low HPV vaccination coverage levels were the focus of the *2012–13 President's Cancer Panel Report* (available at http://deainfo.nci.nih.gov/advisory/pcp/annualreports/hpv/index.htm#sthash.BMZC8JOe.dpbs). Included in the report was a recommendation to expand the HEDIS HPV vaccination

Summary

What is already known on this topic?

Human papillomavirus (HPV) is a major public health problem that currently affects 79 million persons in the United States. HPV vaccination is routinely recommended for adolescents aged 11–12 years. Performance measures can be used to assess the effectiveness of health insurance plans in providing HPV vaccination to their members.

What is added by this report?

Using 2013 data from the Healthcare Effectiveness Data and Information Set (HEDIS), 367 commercial plans and 153 Medicaid plans submitted performance rates on a measure assessing whether female adolescent plan members received the recommended series of three HPV vaccine doses by age 13 years. Nationally, the median HPV vaccination coverage levels for female adolescents among commercial and Medicaid plans were 12% and 19%, respectively (maximum rates = 34% commercial, 52% Medicaid).

What are the implications for public health practice?

Based on HEDIS performance rates, improving HPV vaccination coverage in female adolescents and information about how the highest-performing health plans support HPV vaccination are needed. Understanding barriers to vaccination and perspectives of clinicians or family members, and incentives that might facilitate vaccination coverage are important.

measure to include adolescent males, since the ACIP expanded routine HPV vaccine recommendations to include males in 2011 (*10*). NCQA is following its established measures development process to assess the feasibility of measuring receipt of HPV vaccination among male adolescents in health plans.

Improving HPV vaccination coverage among female adolescents and understanding how the highest-performing health plans support HPV vaccination are needed. Knowledge of barriers and attitudes of clinicians or family members that might contribute to low vaccination coverage, and incentives that might contribute to differences in vaccination coverage between Medicaid and commercial plans, are needed. Characterizing the strategies and best practices used by higher performing plans will be important for improving HPV vaccination coverage in the United States. Increasing delivery of HPV vaccination at the recommended ages of 11 or 12 years, before most adolescents are exposed to the virus, can ensure adolescents are protected against HPV infections and associated cancers.

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References

1. Satterwhite CL, Torrone E, Meites E, et al. Sexually transmitted infections among US women and men: prevalence and incidence estimates, 2008. Sex Transm Dis 2013;40:187–93.
2. CDC. Number of HPV-attributable cancers per year. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/cancer/hpv/statistics/cases.htm.
3. Markowitz LE, Dunne EF, Saraiya M, et al. Human papillomavirus vaccination: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep 2014;63(No. RR-5).
4. National Committee for Quality Assurance. Health insurance plan rankings 2013–14. Washington, DC: National Committee for Quality Assurance; 2014. Available at http://www.ncqa.org/ReportCards/HealthPlans/HealthInsurancePlanRankings/HealthInsurancePlanRankings201314.aspx.
5. Elam-Evans LD, Yankey D, Jeyarajah J, et al. National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years—United States, 2013. MMWR Morb Mortal Wkly Rep 2014;63:625–33.
6. Curtis CR, Dorell C, Yankey D, et al. National human papillomavirus vaccination coverage among adolescents aged 13–17 years—National Immunization Survey-Teen, United States, 2011. MMWR Surveill Summ 2014;63(Suppl 2):61–70.
7. Daley MF, Crane LA, Markowitz LE, et al. Human papillomavirus vaccination practices: a survey of US physicians 18 months after licensure. Pediatrics 2010;126:425–33.
8. Allison MA, Dunne EF, Markowitz LE, et al. HPV vaccination of boys in primary care practices. Acad Pediatr 2013;13:466–74.
9. Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S. Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. JAMA Pediatr 2014;168:76–82.
10. CDC. Recommendations on the use of quadrivalent human papillomavirus vaccine in males—Advisory Committee on Immunization Practices (ACIP), 2011. MMWR Morb Mortal Wkly Rep 2011;60:1705–8.

Active Bacterial Core Surveillance for Legionellosis — United States, 2011–2013

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During 2000–2011, passive surveillance for legionellosis in the United States demonstrated a 249% increase in crude incidence, although little was known about the clinical course and method of diagnosis. In 2011, a system of active, population-based surveillance for legionellosis was instituted through CDC's Active Bacterial Core surveillance (ABCs) program. Overall disease rates were similar in both the passive and active systems, but more complete demographic information and additional clinical and laboratory data were only available from ABCs. ABCs data during 2011–2013 showed that approximately 44% of patients with legionellosis required intensive care, and 9% died. Disease incidence was higher among blacks than whites and was 10 times higher in New York than California. Laboratory data indicated a reliance on urinary antigen testing, which only detects *Legionella pneumophila* serogroup 1 (Lp1). ABCs data highlight the severity of the disease, the need to better understand racial and regional differences, and the need for better diagnostic testing to detect infections.

Legionellosis is acquired by inhalation of *Legionella* bacteria in aerosolized water. The two main clinical syndromes associated with legionellosis are Legionnaires' disease, a severe form of pneumonia, and Pontiac fever, a milder, self-limited illness without pneumonia. National Notifiable Diseases Surveillance System (NNDSS) data reported during 2000–2011 demonstrated a 249% increase in crude incidence of legionellosis in the United States, from 0.39 to 1.36 cases per 100,000 persons (*1*,*2*). NNDSS is a passive public health reporting system that relies on laboratories and physicians to report cases and does not capture testing method, clinical course, or information about underlying medical conditions. Most of what is known about the clinical course and outcomes of legionellosis comes from published reports of case series and outbreaks, which might not be representative of the overall epidemiology of legionellosis. In 2011, active surveillance for legionellosis was initiated through CDC's ABCs program to describe the incidence and epidemiologic and clinical characteristics of legionellosis in a large, geographically diverse population. Data from the first 3 years of ABCs surveillance were analyzed and compared with those collected through the NNDSS passive legionellosis surveillance system.

ABCs, part of the Emerging Infections Program network of CDC, is an active, laboratory- and population-based surveillance system at 10 sites in the United States. A catchment area is found in every region of the United States (statewide in Connecticut, Maryland, Minnesota, New Mexico, and Oregon, and in selected counties in California, Colorado, Georgia, New York, and Tennessee), covering a population of approximately 36 million persons (http://www.cdc.gov/abcs/methodology/index.html). NNDSS covers the entire U.S. population; however, NNDSS relies on laboratories and physicians to report legionellosis cases to local or state public health authorities, who in turn, transmit the data to CDC. Unlike ABCs legionellosis surveillance, NNDSS does not include testing method, clinical course, or information about patients' underlying medical conditions.

ABCs personnel actively contacted laboratories that serve persons who live in the surveillance catchment areas to identify legionellosis cases that were confirmed by a laboratory test during January 1, 2011–December 31, 2013. For surveillance purposes, ABCs defined a confirmed case of legionellosis as the isolation of *Legionella* from respiratory culture, detection of *Legionella* antigen in urine, or seroconversion (a more than fourfold rise in antibody titer between acute and convalescent sera) to Lp1. The NNDSS case definition differs slightly: cases must have an illness that is clinically compatible with legionellosis in addition to the laboratory criteria mentioned for the active system.

ABCs personnel reviewed medical records for all cases using a standardized form to collect information on demographics, underlying medical conditions, diagnostic tests performed, clinical courses, and outcomes. Race was recorded from the medical record and categorized as white, black, or other (American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander). Missing race data (approximately 8%) were imputed using sequential regression imputation. Incidence was calculated using 2013 U.S. postcensal population estimates. NNDSS data were obtained from the Summary of Notifiable Diseases (*2*).

ABCs identified 1,426 legionellosis cases during 2011–2013, for an incidence of 1.3 cases per 100,000 population over the 3 years. For 2011, 2012, and 2013, the rates were 1.3, 1.1, and 1.4 cases per 100,000, respectively. In 2012, the most recent

year that NNDSS rates were available, legionellosis incidence was the same as that found in ABCs (1.1 per 100,000 population), and the number of cases reported to NNDSS and projected to the U.S. population from ABCs were similar (3,688 cases versus 3,362 cases, respectively). ABCs incidence rates in whites (1.0 per 100,000) and blacks (1.5 per 100,000) were similar to NNDSS rates in whites (1.0 per 100,000) and blacks (1.4 per 100,000); 17% of cases reported to NNDSS were missing race categorization. Rates increased with age. In ABCs, rates per 100,000 population (by age category) were 0.4 (<50 years), 2.5 (50–64 years), 3.6 (65–79 years), and 4.7 (≥80 years). Legionellosis incidence by ABCs sites varied during 2011–2013, from 0.4 per 100,000 population in California to 4.0 per 100,000 population in New York. The three highest incidence sites during this period, New York, Maryland, and Connecticut, are all located in the Northeast or Mid-Atlantic United States (Table 1). This is consistent with NNDSS data that show a higher incidence of legionellosis in these regions compared with other regions (*1*).

Among cases identified during 2011–2013, 79% occurred in persons aged >50 years, 65% were in males, and 72% of patients were white (Table 2). Seven percent of patients were residents of health care facilities (e.g., acute care hospitals, long-term care facilities, or long-term acute care facilities) during at least part of the period they were likely exposed to *Legionella*. Current smoking was the most common underlying condition (38%), followed by diabetes (30%), chronic obstructive pulmonary disease (16%), immune compromise (14%), and former smoking (14%). Almost all patients with legionellosis (1,354 [95%]) had a diagnosis of pneumonia; 98% were hospitalized, 44% were admitted to an intensive care unit (ICU), and 27% required mechanical ventilation. The median duration of hospitalization was 7 days. Overall, 134 (9%) patients with legionellosis died (Table 2).

Among all patients, 1,300 (91%) received a diagnosis of legionellosis on the basis of urine antigen testing, which only detects Lp1 species (Table 3). Cultures were performed on respiratory specimens from 330 (23%) patients. Among these, specimens from 140 patients (42%, representing 10% of all cases) tested positive for *Legionella*, 112 (80%) of which were Lp1. Specimens from 13 (9%) of these 140 patients were identified as non-Lp1, and the remainder (15) had *Legionella* species that were not further identified.

TABLE 1. Legionellosis incidence* ascertained from Active Bacterial Core surveillance (ABCs), by ABCs surveillance site — United States, 2011–2013

ABCs site	Incidence*
California	0.4
Colorado	1.0
Connecticut†	1.9
Georgia	0.7
Maryland†	2.2
Minnesota†	0.8
New Mexico†	0.5
New York	4.0
Oregon†	0.5
Tennessee	1.1

* Per 100,000 population.
† ABCs sites where the entire population of the state is under surveillance.

TABLE 2. Demographic and clinical characteristics of persons with confirmed legionellosis infection (N = 1,426) identified through Active Bacterial Core surveillance — United States, 2011–2013

Characteristic	No.	(%)
Age group (yrs)		
<50	299	(21.0)
50–64	562	(39.4)
65–79	383	(26.9)
≥80	182	(12.8)
Sex		
Male	920	(64.5)
Race		
White	1,028	(72.1)
Black	375	(26.3)
Other*	227	(1.6)
Underlying conditions†		
Current smoker	544	(38.1)
Diabetes	421	(29.5)
Chronic obstructive pulmonary disease	232	(16.3)
Immunocompromised§	200	(14.0)
Former smoker	197	(13.8)
Heart failure	163	(11.4)
Alcohol abuse	119	(8.3)
Outcome		
Intensive care unit admission	620	(43.5)
Mechanical ventilation required	379	(26.6)
Death	134	(9.4)
Diagnostic test¶		
Urine antigen	1,300	(91.2)
Respiratory culture positive	140	(9.8)

* Includes American Indian/Alaska Native, Asian, and Native Hawaiian/Other Pacific Islander.
† Conditions documented in the medical record during legionellosis admission and captured by ABCs abstractors.
§ Includes one or more of the following conditions or therapies: acquired immunodeficiency syndrome (AIDS) (12), complement deficiency (one), immunoglobulin deficiency (three), asplenia (eight), or on immunosuppressive therapy (176).
¶ Patients might have more than one diagnostic test.

Discussion

The first 3 years of active population-based surveillance for legionellosis demonstrated similar rates of disease compared with the rates detected through passive surveillance, including regional and racial/ethnic differences (*1*,*2*). However, the data from ABCs provided additional information on clinical history, disease severity, and diagnostic testing. The reported incidence in both systems is likely an underestimate because of reliance on urine antigen testing, which only detects Lp1.

TABLE 3. Tests used to diagnose *Legionella pneumophila* serogroup 1 (Lp1) and other *Legionella* species and serogroups among legionellosis patients (N = 1,426) — Active Bacterial Core surveillance, United States, 2011–2013

Legionella species	Testing method(s)	Total
Lp1	Urine antigen only (1,286) Urine antigen and respiratory culture (102) Respiratory culture only (10)	1,398
Non-Lp1	Respiratory culture	13
Undetermined	Respiratory culture	15
Total		**1,426**

In addition, not all patients at risk for legionellosis are likely tested by any diagnostic method.

The racial/ethnic differences in legionellosis incidence might reflect disparities in the prevalence of underlying medical conditions, socioeconomic determinants, and environmental exposures (*3*). Geographic differences in incidence might be influenced by regional differences in environmental exposures, testing practices, or the prevalence of underlying medical conditions. Future analyses will take into account underlying conditions, area-level socioeconomic status, and location of residence when calculating rates, to determine whether racial/ethnic and geographic disparities persist.

Approximately 40% of patients with legionellosis required ICU admission, and 9% died. Previous estimates of disease severity did not include rates of ICU admissions, and reported death rates that ranged from <1% in community settings to >60% in nosocomial outbreaks (*4*,*5*). Conditions known to be risk factors for legionellosis, including smoking, alcohol abuse, diabetes, and immune compromise were relatively common among legionellosis patients (*6*). Future ABCs analyses will determine actual rates by health conditions using population-based denominators.

The findings in this report are subject to at least three limitations. First, ABCs is population-based, but covers only a portion of the U.S. population, so results might not be generalizable to the entire population. However, the similar rates identified in NNDSS suggest that ABCs is representative. Second, urine antigen testing, which only detects Lp1 infections and is approximately 70%–90% sensitive (*7*), was the most common method for detecting legionellosis cases. Therefore, some cases of legionellosis likely were missed. Finally, in addition to missing cases because of the test sensitivity, other cases likely were missed because patients with legionellosis were not tested for *Legionella* bacteria by any diagnostic method. Therefore, the rates reported likely represent an underestimate of the actual disease burden of legionellosis.

These findings highlight the importance of developing more sensitive laboratory tests for legionellosis because proper diagnosis is needed for treatment and public health action. In 1998, the proportion of patients who received a diagnosis of legionellosis on the basis of urine antigen testing was 69% (*8*); during 2011–2013, this proportion had increased to >90%. With fewer patients being tested by culture, the likelihood that more non-Lp1 cases are being missed exists. Development of molecular-based tests that can detect more species and serogroups from respiratory specimens will likely improve detection (*9*). Because up to half of patients with legionellosis might not produce sputum, more sensitive urine diagnostics are needed (*10*). Until such diagnostic tests are developed, validated and implemented, obtaining respiratory specimens for culture from persons suspected to have legionellosis infection is important for diagnosis and initiation of appropriate treatment. Clinical cultures also are important to establish linkage between individual patients and environmental sources in outbreak settings. The underlying reasons for geographic and racial differences in legionellosis incidence need further exploration, which can be done through additional analyses in ABCs.

Summary

What is already known on this topic?

Passive surveillance for legionellosis in the United States indicated a 249% increase in crude incidence during 2000–2011.

What is added by this report?

Findings from the first 3 years of Active Bacterial Core Surveillance (ABCs) for legionellosis in the United States highlight the severity of legionellosis, the need to better understand racial and regional differences, and the need for better diagnostics to detect non–*Legionella pneumophila* serogroup 1 infections.

What are the implications for public health practice?

Until better diagnostics are developed, obtaining respiratory cultures from persons suspected to have legionellosis continues to be important for diagnosing disease and detecting the source of infection in outbreaks. The underlying reasons for geographic and racial differences in legionellosis incidence need further exploration, which will be done through additional analyses in ABCs.

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References

1. CDC. Legionellosis—United States, 2000–2009. MMWR Morb Mortal Wkly Rep 2011;60:1083–6.
2. Adams DA, Jajosky RA, Ajani U, et al. Summary of notifiable diseases—United States, 2012. MMWR Morb Mortal Wkly Rep 2014;61(No. 53).
3. CDC. CDC health disparities and inequalities report—United States, 2013. MMWR Surveill Summ 2013;62(Suppl No. 3).
4. Marrie TJ, MacDonald S, Clarke K, Haldane D. Nosocomial Legionnaires' disease: lessons from a four-year prospective study. Am J Infect Control 1991;19:79–85.
5. Fields BS, Benson RF, Besser RE. *Legionella* and Legionnaires' disease: 25 years of investigation. Clin Microbiol Rev 2002;15:506–26.
6. Marston BJ, Lipman HB, Breiman RF. Surveillance for Legionnaires' disease. Risk factors for morbidity and mortality. Arch Intern Med 1994;154:2417–22.
7. Waterer GW, Baselski VS, Wunderink RG. *Legionella* and community-acquired pneumonia: a review of current diagnostic tests from a clinician's viewpoint. Am J Med 2001;110:41–8.
8. Benin AL, Benson RF, Besser RE. Trends in Legionnaires disease, 1980–1998: declining mortality and new patterns of diagnosis. Clin Infect Dis 2002;35:1039–46.
9. Benitez AJ, Winchell JM. Clinical application of a multiplex real-time PCR assay for simultaneous detection of *Legionella* species, *Legionella pneumophila*, and *Legionella pneumophila* serogroup 1. J Clin Microbiol 2013;51:348–51.
10. Murdoch DR. Diagnosis of *Legionella* infection. Clin Infect Dis 2003;36:64–9.

State Medicaid Coverage for Tobacco Cessation Treatments and Barriers to Coverage — United States, 2014–2015

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Medicaid enrollees have a cigarette smoking prevalence (30.4%) twice as high as that of privately insured Americans (14.7%), placing them at increased risk for smoking-related disease and death (*1*). Individual, group, and telephone counseling and seven Food and Drug Administration (FDA)–approved medications are evidence-based, effective treatments for helping tobacco users quit (*2*). A *Healthy People 2020* objective (TU-8) calls for all state Medicaid programs to adopt comprehensive coverage of these treatments.* However, a previous *MMWR* report indicated that, although state Medicaid coverage of cessation treatments had improved during 2008–2014, this coverage was still limited in most states (*3*). To monitor the most recent trends in state Medicaid cessation coverage, the American Lung Association collected data on coverage of, and barriers to, accessing all evidence-based cessation treatments except telephone counseling† in state Medicaid programs (for a total of nine treatments) during January 31, 2014–June 30, 2015. As of June 30, 2015, all 50 states covered certain cessation treatments for at least some Medicaid enrollees. During 2014–2015, increases were observed in the number of states covering individual counseling, group counseling, and all seven FDA-approved cessation medications for all Medicaid enrollees; however, only nine states covered all nine treatments for all enrollees. Common barriers to accessing covered treatments included prior authorization requirements, limits on duration, annual limits on quit attempts, and required copayments. Previous research in both Medicaid and other populations indicates that state Medicaid programs could reduce smoking prevalence, smoking-related morbidity, and smoking-related health care costs among Medicaid enrollees by covering all evidence-based cessation treatments, removing all barriers to accessing these treatments, promoting coverage to Medicaid enrollees and health care providers, and monitoring use of covered treatments (*2,4–7*).

To assess state Medicaid tobacco cessation coverage, during August 2014–June 2015, the American Lung Association compiled data from Medicaid member websites and handbooks, Medicaid provider websites and handbooks, Medicaid policy manuals, preferred drug lists/formularies, and relevant regulations and legislation. Researchers searched for mentions of the nine cessation treatments considered in this study by using search functions on state Medicaid websites, other relevant state-sponsored websites, and the Google search engine. These data were then confirmed through consultations with staff members of state Medicaid agencies and health departments, or other knowledgeable state government personnel. Consultations were also used to supply missing documents and reconcile discrepancies. A state Medicaid program or managed care plan was only considered to cover a tobacco cessation treatment if documentation was available for this coverage. Information on state Medicaid cessation coverage compiled by the American Lung Association is available on the CDC State Activities Tracking and Evaluation (STATE) System, a database that contains tobacco-related epidemiologic and economic data and information on state tobacco-related legislation.§

As of June 2015, nine states (Connecticut, Indiana, Maine, Massachusetts, Minnesota, North Dakota, Ohio, Pennsylvania, and Vermont) cover all nine evidence-based cessation treatments considered in this study for all Medicaid enrollees, up from six states in January 2014.¶ Maine, North Dakota, and Ohio achieved this level of coverage during the study period. However, all nine states with this level of coverage have barriers, such as copayments (seven of nine states) or prior authorization requirements (seven of nine states), in place for some treatments. As of June 2015, 31 states covered individual counseling for all populations and plans (up from 27 in 2014), and 10 states covered group counseling for all populations and plans (up from seven in 2014) (Table 1). Additionally, 30 states covered all seven FDA-approved cessation medications for all populations and plans (up from 26 states in 2014) (Table 2). The most common barriers included prior authorization requirements (with 39 states reporting this barrier for at least certain populations or plans), limits on duration (38 states), annual limits on quit attempts (36 states), and required copayments (34 states) (Table 3).

* Additional information available at http://www.healthypeople.gov/2020/topics-objectives/topic/tobacco-use/objectives.

† Telephone counseling is available free to callers to state quitlines (including Medicaid enrollees) in all 50 states and the District of Columbia through the national quitline portal 1-800-QUIT-NOW, and therefore is not captured by this report. In June 2011, the Centers for Medicare and Medicaid Services announced that it would offer a 50% federal administrative match to state Medicaid programs for the cost of state quitline counseling provided to Medicaid enrollees.

§ Additional information available at http://www.cdc.gov/statesystem. Certain data presented in this report differ slightly from Medicaid cessation coverage data reported in the STATE System because of slightly different coding rules, categories, and reporting periods.

¶ Nevada was previously reported to cover all nine treatments considered in this report (*3*); however, researchers have since found that the Nevada Medicaid program does not cover group counseling.

TABLE 1. Medicaid coverage for tobacco cessation counseling, by state — United States, 2014–2015*,†

State	Individual counseling		Group counseling	
	2014	2015	2014	2015
Alabama	P	P	No	No
Alaska	Yes	Yes	No	No
Arizona	P	P	No	No
Arkansas	Yes	Yes	No	No
California	V	V	V	V
Colorado	P	P	P	P
Connecticut	Yes	Yes	Yes	Yes
Delaware	Yes	Yes	No	No
District of Columbia	Yes	NA	No	NA
Florida	V	V	V	V
Georgia	Yes	Yes	No	No
Hawaii	V	V	V	V
Idaho	No	Yes	No	No
Illinois	No	No	No	No
Indiana	Yes	Yes	Yes	Yes
Iowa	Yes	Yes	No	No
Kansas	P	P	P	P
Kentucky	V	V	V	V
Louisiana	No	No	V	V
Maine	Yes	Yes	No	Yes
Maryland	V	Yes	V	V
Massachusetts	Yes	Yes	Yes	Yes
Michigan	Yes	Yes	V	V
Minnesota	Yes	Yes	Yes	Yes
Mississippi	V	V	V	No
Missouri	Yes	Yes	No	No
Montana	Yes	Yes	No	No
Nebraska	Yes	Yes	V	No
Nevada	Yes	Yes	No§	No
New Hampshire	Yes	Yes	V§	V
New Jersey	No	Yes	No	No
New Mexico	V	Yes	V	No
New York	Yes	Yes	Yes	Yes
North Carolina	Yes	Yes	No	No
North Dakota	P	Yes	No	Yes
Ohio	V	Yes	V	Yes
Oklahoma	Yes	Yes	No	No
Oregon	Yes	Yes	V	V
Pennsylvania	Yes	Yes	Yes	Yes
Rhode Island	Yes	Yes	V	V
South Carolina	V	V	V	V
South Dakota	NA	P	NA	No
Tennessee	No	No	No	No
Texas	V	V	V	V
Utah	P	P	P	P
Vermont	Yes	Yes	Yes	Yes
Virginia	Yes	V	V	V
Washington	V	V	No	No
West Virginia	No	No	V	V
Wisconsin	Yes	Yes	V	V
Wyoming	Yes	Yes	No	No
Counts				
Yes	27	31	7	10
No	6	4	21	22
V	11	9	19	15
P	6	6	3	3
NA	1	1	1	1

Abbreviations: V = varies by plan; P = pregnant women only; NA = not available.
* Data as of January 31, 2014, and June 30, 2015.
† Because of differences in the methods and timing of data collection, certain findings differ from reports published before 2014 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5941a4.htm).
§ Corrected from previous report.

Discussion

Although some progress in state Medicaid coverage of proven tobacco cessation treatments occurred during the study period, only nine states cover all nine treatments considered in this report for all Medicaid enrollees. Moreover, all of these states still have some barriers in place that make it more difficult for Medicaid enrollees to access these treatments, which would be expected to impede use of these treatments, quit attempts, and successful cessation (*2*). Removing these barriers increases access to and use of cessation treatments for both Medicaid enrollees and other populations (*2,5*). Comprehensive Medicaid tobacco cessation coverage with minimal barriers has the potential to help more Medicaid enrollees quit tobacco (*4,5*). Continued efforts by state Medicaid programs to increase coverage and use of evidence-based cessation treatments would be expected to result in improved health outcomes among Medicaid enrollees and reduced Medicaid health care costs (*6,7*).

Insurance coverage of evidence-based cessation treatments leads to increases in quit attempts, use of cessation treatments, and successful smoking cessation (*2*). One study determined that more comprehensive state Medicaid coverage for cessation treatments was associated with increased quit rates among smokers enrolled in Medicaid (*4*).

Effective January 2014, section 2502 of the 2010 Patient Protection and Affordable Care Act barred state Medicaid programs from excluding FDA-approved cessation medications from coverage.**,†† The Centers for Medicare and Medicaid Services has issued guidance to states on implementing this provision.§§,¶¶,*** This study finds that some states have improved their coverage of cessation medications during the study period. Other states might have improved this coverage

** Patient Protection and Affordable Care Act of 2010. Pub. L. No. 114–48 (March 23, 2010), as amended through May 1, 2010. Available at http://docs.house.gov/energycommerce/ppacacon.pdf.
†† Affordable Care Act provision section 4107 required state Medicaid programs to cover tobacco cessation counseling and pharmacotherapy for pregnant women with no cost-sharing, effective October 2010, which has resulted in increased state Medicaid coverage of cessation counseling and medications for pregnant women (*8*).
§§ Additional information available at http://www.medicaid.gov/medicaid-chip-program-information/by-topics/benefits/prescription-drugs/downloads/rx-releases/state-releases/state-rel-165.pdf.
¶¶ As of October 23, 2015, the Centers for Medicare and Medicaid Services had published State Plan Amendments from 36 states declaring that they have implemented this provision.
*** In addition to the Affordable Care Act provisions mentioned in this report, this legislation, as written, also provides strong incentives for all states to expand eligibility for Medicaid coverage. Although the Supreme Court ruling in June 2012 held that a state cannot lose federal funding for its existing Medicaid program if it does not participate in the expansion, 30 states and the District of Columbia have expanded Medicaid as of October 23, 2015 (http://kff.org/health-reform/slide/current-status-of-the-medicaid-expansion-decision). This is expected to further increase the number of smokers who have access to cessation treatments in expansion states; however, information for a comprehensive evaluation of cessation coverage in the Medicaid expansion population is not currently available.

TABLE 2. Medicaid coverage for tobacco cessation medications, by state — United States, 2014–2015*,†

	Nicotine patch		Nicotine gum		Nicotine lozenge		Nicotine nasal spray		Nicotine inhaler		Bupropion (Zyban)		Varenicline (Chantix)	
State	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**
Alabama	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alaska	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Arizona	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Arkansas	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes
California	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Colorado	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Connecticut	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delaware	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District of Columbia	V	NA	V	NA	V	NA	No	NA	No	NA	No	NA	No	NA
Florida	V	Yes	V	Yes	V	Yes	V	No	V	No	V	Yes	V	Yes
Georgia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hawaii	Yes	Yes	Yes	Yes	V	V	V	V	V	V	V	V	V	V
Idaho	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Illinois	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Indiana	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iowa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kansas	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kentucky	Yes	Yes	V	V	V	V	V	V	V	V	V	V	V	V
Louisiana	Yes	V	Yes	V	V	V	V	V	V	V	Yes	Yes	V	V
Maine	P	Yes	P	Yes	P	Yes	P	Yes	P	Yes	P	Yes	P	Yes
Maryland	Yes	Yes	V	Yes	V	Yes	V	Yes	V	Yes	Yes	Yes	V	Yes
Massachusetts	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Michigan	Yes	Yes	Yes	Yes	V	Yes	V	V	V	Yes	Yes	Yes	Yes	Yes
Minnesota	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mississippi	Yes	Yes	Yes	Yes	Yes	Yes	V	V	V	V	Yes	Yes	Yes	Yes
Missouri	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Montana	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
Nebraska	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Nevada	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New Hampshire	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New Jersey	Yes	Yes	Yes	Yes	V	Yes	V	Yes	V	Yes	Yes	Yes	V	Yes
New Mexico	Yes	Yes	Yes	Yes	Yes	Yes	Yes	V	Yes	V	Yes	V	Yes	Yes
New York	Yes	Yes	Yes	Yes	V	V	V	V	V	V	Yes	Yes	Yes	Yes
North Carolina	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
North Dakota	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ohio	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oklahoma	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oregon	Yes	V	V	V	V	V	V	V	V	V	Yes	V	Yes	V
Pennsylvania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rhode Island	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
South Carolina	Yes	Yes	V	Yes	V	V	V	V	V	V	V	V	V	V
South Dakota	P	P	P	P	P	P	No	No	No	No	NA	Yes	NA	Yes
Tennessee	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Texas	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Utah	V	V	V	V	V	V	V	V	V	V	Yes	Yes	Yes	Yes
Vermont	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Virginia	Yes	Yes	V	V	V	V	V	V	V	V	Yes	V	V	V
Washington	V	V	V	V	V	V	V	V	V	V	V	V	V	V
West Virginia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Wisconsin	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wyoming	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Counts														
Yes	45	45	40	43	30	38	28	32	29	33	43	43	38	42
No	0	0	0	0	5	2	8	6	7	6	1	0	2	1
V	4	4	9	6	14	9	14	12	14	11	5	7	9	7
P	2	1	2	1	2	1	1	0	1	0	1	0	1	0
NA	0	1	0	1	0	1	0	1	0	1	1	1	1	1

Abbreviations: V = varies by plan; P = pregnant women only; NA = not available.

* Data as of January 31, 2014, and June 30, 2015.

† Because of differences in the methods and timing of data collection, certain findings differ from reports published before 2014 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5941a4.htm).

TABLE 3. Barriers to Medicaid coverage for tobacco cessation treatments, by state — United States, 2014 and 2015*,†,§

State	Copayments required		Prior authorization required		Counseling required for medications		Stepped-care therapy		Limits on duration		Annual limit on quit attempts		Lifetime limit on quit attempts	
	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015	2014	2015
Alabama	Yes¶	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Alaska	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Arizona	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Arkansas	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
California	No	No	V	V	V	No	V	V	V	V	V	V	No	No
Colorado	V	V	Yes	Yes	V	V	No	No	Yes	Yes	Yes	Yes	No	No
Connecticut	No	No	Yes	Yes	No	No	No	No	Yes	Yes	Yes	No	No	No
Delaware	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No
District of Columbia	No	NA	No	NA	No	NA	No	NA	V	NA	No	NA	No	NA
Florida	V	V	V	V	V	No	V	V	V	V	V	V	V	V
Georgia	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Hawaii	V	V	V	V	V	V	V	V	V	V	Yes	Yes	No	No
Idaho	No	No	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	No	No
Illinois	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Indiana	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Iowa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Kansas	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Kentucky	No	V	V	V	V	V	No	No	V	V	V	V	No	No
Louisiana	Yes	Yes	No	V	V	V	No	No	V	V	No	No	No	No
Maine	No	No	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
Maryland	V	V	V	V	V	V	V	V	V	V	V	V	V	No
Massachusetts	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	No	No
Michigan	V	No	V	V	V	No	V	V	V	V	V	Yes	No¶	No
Minnesota	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Mississippi	Yes	V	No	No	No	No	No	No	V	Yes	No	No	No	No
Missouri	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Montana	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Nebraska	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Nevada	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
New Hampshire	Yes	Yes	Yes¶	Yes	No	No	No	No	No	No	Yes	Yes	No	No
New Jersey	V	V	V	V	No	No	No	No	V	V	V	V	V	V
New Mexico	No	No	V	V	No	V	No	No	V	V	V	V	No	No
New York	V	V	V	V	No	No	No	No	Yes	Yes	Yes	Yes	No	No
North Carolina	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No	No	No
North Dakota	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Ohio	V	Yes	V	V	No	No	V	V	V	No	No	No	No	No
Oklahoma	Yes	Yes	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	No	No
Oregon	V	No	V	V	V	V	No	No	V	V	V	V	No	No
Pennsylvania	Yes	Yes	V	V	No	No	No	No	Yes	Yes	Yes	No	No	No
Rhode Island	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
South Carolina	V	V	V	V	V	V	V	V	Yes	Yes	V	V	No	No
South Dakota	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Tennessee	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No	Yes	No	No
Texas	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Utah	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Vermont	Yes	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Virginia	V	V	V	V	No	V	V	V	V	V	V	V	No	No
Washington	No	No	V	V	V	V	No	No	V	V	V	V	V	V
West Virginia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Wisconsin	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Wyoming	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Counts														
Yes	25	24	22	23	12	10	8	11	25	26	27	26	2	1
No	15	16	14	11	28	30	35	31	11	12	13	14	45	46
V	11	10	15	16	11	10	8	8	15	12	11	10	4	3
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NA	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Abbreviations: V = varies by plan; P = pregnant women only; NA = not available.

* Data as of January 31, 2014, and June 30, 2015.

† Because of differences in the methods and timing of data collection, certain findings differ from reports published before 2014 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5941a4.htm).

§ Barriers apply to one or more cessation treatments.

¶ Corrected from previous report.

before the study period in response to this provision. State Medicaid programs can maximize the effect of this provision on cessation by placing tobacco cessation medications on preferred drug lists (or similar documents), removing barriers to accessing these medications, and adding notices of coverage to public plan documents (*9*). State Medicaid programs can also increase cessation among Medicaid enrollees by covering cessation counseling along with cessation medications, because the combined use of these treatments is more effective in increasing quit rates than the use of either alone (*2*).

The findings in this report are subject to at least four limitations. First, 2015 data were not available for the District of Columbia. Second, in cases where official documents were not publicly available or conflicted with one another, knowledgeable state government personnel were consulted to provide non-public documentation or resolve discrepancies; this information might have been inaccurate in some cases. Third, cessation coverage can vary widely across Medicaid managed care plans, making it difficult to determine the coverage provided by specific plans in practice. Finally, this report does not assess promotion, awareness, or use of state Medicaid cessation coverage. The extent to which smokers use covered treatments is a key factor in determining the effect of cessation coverage, and promotion and awareness of coverage in turn determine the level of use. Although examining these factors is important to accurately evaluate the impact of a state's Medicaid cessation coverage, this type of data is not currently available in most states. It is important to identify an approach to obtain information on use of cessation treatments by Medicaid enrollees.

Although state Medicaid cessation coverage improved during 2014–2015, coverage still falls substantially short of the *Healthy People 2020* target of full coverage in all 50 states and the District of Columbia; almost six million Medicaid enrollees continue to smoke cigarettes (*1*). Smoking-related diseases accounted for approximately 15% of annual Medicaid spending during 2006–2010, amounting to more than $39 billion per year (*10*).

State Medicaid programs can maximize tobacco cessation among Medicaid enrollees by covering all evidence-based cessation treatments, removing barriers that impede access to these treatments, promoting their coverage to Medicaid tobacco users and health care providers, and monitoring use of covered treatments (*5*–*7*). State Medicaid programs that take these actions have the potential to substantially reduce tobacco use, tobacco-related disease, and health care costs among Medicaid enrollees.

Summary

What is already known on this topic?

Medicaid enrollees smoke cigarettes at a higher rate than privately insured U.S. residents. Comprehensive state Medicaid cessation coverage has the potential to reduce smoking, smoking-related disease, and health care costs among Medicaid enrollees. Although state Medicaid coverage of cessation treatments had improved during 2008–2014, this coverage was still limited in most states.

What is added by this report?

Although state Medicaid cessation coverage improved during 2014–2015, coverage continues to fall substantially short of the *Healthy People 2020* target of full coverage in all 50 states and the District of Columbia. As of June 2015, only nine states cover all nine evidence-based cessation treatments considered in this study for all Medicaid enrollees, up from six states in 2014. All of these states have barriers to accessing some treatments.

What are the implications for public health practice?

State Medicaid programs can help more Medicaid enrollees quit tobacco use by covering all evidence-based cessation treatments, removing barriers that make it difficult for enrollees to access these treatments, promoting cessation coverage, and monitoring use of covered treatments. State Medicaid programs can enhance the effect of the Affordable Care Act provision barring state Medicaid coverage from excluding cessation medications by placing these medications on preferred drug lists, removing barriers to accessing these medications, and covering cessation counseling as well as medications.

Acknowledgments

Paul G. Billings, Susan J. Rappaport, Kim Lacina, Erika Sward, Katherine Pruitt, Bill Blatt, Thomas Carr, Allison MacMunn, Gregg Tubbs, Catherine Fields Chandler, Meredith Haddix, American Lung Association National Office, Washington, DC; American Lung Association; Suzanne R. Abbott, Heather Smith, Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

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References

1. CDC. National Health Interview Survey: tables of summary health statistics. 2013. Available at http://www.cdc.gov/nchs/nhis/SHS_tables.htm.
2. US Public Health Service. Treating tobacco use and dependence: 2008 update. Clinical practice guideline. Rockville, MD: US Department of Health and Human Services, US Public Health Service; 2008. Available at http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/tobacco/index.html.

3. Singleterry J, Jump Z, Lancet E, Babb S, MacNeil A, Zhang L. State Medicaid coverage for tobacco cessation treatments and barriers to coverage—United States, 2008–2014. MMWR Morb Mortal Wkly Rep 2014;63:264–9.
4. Greene J, Sacks RM, McMenamin SB. The impact of tobacco dependence treatment coverage and copayments in Medicaid. Am J Prev Med 2014; 46:331–6.
5. Land T, Warner D, Paskowsky M, et al. Medicaid coverage for tobacco dependence treatments in Massachusetts and associated decreases in smoking prevalence. PLoS One 2010;5:e9770.
6. Land T, Rigotti NA, Levy DE, et al. A longitudinal study of Medicaid coverage for tobacco dependence treatments in Massachusetts and associated decreases in hospitalizations for cardiovascular disease. PLoS Med 2010;7:e1000375.
7. Richard P, West K, Ku L. The return on investment of a Medicaid tobacco cessation program in Massachusetts. PLoS One 2012;7:e29665.
8. McMenamin SB, Halpin HA, Ganiats TG. Medicaid coverage of tobacco-dependence treatment for pregnant women: impact of the Affordable Care Act. Am J Prev Med 2012;43:e27–9.
9. McAfee T, Babb S, McNabb S, Fiore MC. Helping smokers quit—opportunities created by the Affordable Care Act. N Engl J Med 2015;372:5–7.
10. Xu X, Bishop EE, Kennedy SM, Simpson SA, Pechacek TF. Annual healthcare spending attributable to cigarette smoking: an update. Am J Prev Med 2015;48:326–33.

Notes from the Field

Update on Multistate Outbreak of Fungal Infections Associated with Contaminated Methylprednisolone Injections, 2012–2014

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During September 2012, CDC, in collaboration with state and local health departments and the Food and Drug Administration (FDA), investigated a multistate outbreak of fungal meningitis and other infections caused by injections of contaminated methylprednisolone acetate solution (MPA) (*1*). After this unprecedented outbreak, scientists in the CDC Mycotic Diseases Branch, along with infectious diseases specialists who cared for patients from the outbreak, clinical experts, and public health officials from affected states, have continued to monitor the recovery of affected patients. A long-term follow-up study involving these patients was initiated and is being conducted by the Mycoses Study Group Education and Research Consortium (MSGERC). This update summarizes subsequent information about the current state of the outbreak.

By October 23, 2013, the date of the final update to the outbreak website,* 751 patients had been reported. Among all outbreak-related cases, 31% of patients had meningitis only, 20% had meningitis and parameningeal infections, 43% had parameningeal infections only, and 4% had peripheral joint infections. Two additional cases have subsequently been identified, bringing the total to 753 cases. The first of these two cases occurred in 2013, but was only identified retrospectively. The final reported patient developed clinical meningitis (cerebrospinal fluid [CSF] white blood cell count >500/μL) in November 2014, 26 months after receiving a contaminated MPA injection, thereby meeting the CDC probable case definition. The patient's CSF was negative when cultured for various bacteria, viruses, and fungi. Additionally, CSF specimens were negative when tested for *Exserohilum* DNA (the predominant pathogen identified during the outbreak) by polymerase chain reaction. However, the level of 1,3-β-D-glucan (BDG), a fungal marker, was elevated (>600 pg/ml), and decreased (to 57 pg/ml) after antifungal treatment. Testing the CSF of patients affected by this outbreak indicated that BDG might be a sensitive and specific marker for fungal meningitis associated with this outbreak and that BDG levels might correlate with clinical response (*2*,*3*). It is unclear whether this late onset case of meningitis is directly attributable to the contaminated steroid injection or arose from an unrelated etiology.

As part of the MSGERC long-term follow-up study, clinical data for patients involved in the outbreak are being collected by the infectious disease physicians who cared for them. Preliminary data indicate that most patients received antifungal treatment for at least 6 months after diagnosis. By 12 months after the initial diagnosis, 192 (42%) of 455 patients followed by the study were considered cured (defined as no radiologic or laboratory evidence of fungal infection, resolved or improved signs and symptoms, and not having received antifungal treatment for at least 3 months), 185 (41%) were no longer receiving antifungals but did not yet meet the definition of cured, 32 (7%) were still receiving antifungal treatment, 35 (8%) had died (24 deaths were attributable to outbreak-associated infections), and 11 (2%) had incomplete follow-up data.

To date, CDC has received eight reports of relapse of fungal infection after antifungal treatment, accounting for 1% of these 753 patients. Among six relapsed patients for whom the interval from initial cessation of antifungal therapy to relapse date was known, the median time to relapse was 90 days (range = 20–662 days); however, a recently identified relapse that occurred 21 months after cessation of therapy highlights the need for continued vigilance by providers and patients involved in this outbreak.

Among patients who received contaminated MPA injections, it is not known whether resuming additional steroid injections increases the risk for developing either a de novo fungal infection or a relapse of infection. Some patients have had surgical procedures to correct underlying musculoskeletal problems, and a limited number of patients had surgical placement of orthopedic hardware, with no reports of complications attributable to the infection.

Clinicians and patients should remain watchful for symptoms of infection† in patients exposed to contaminated MPA, because fungal infections can develop slowly and are difficult to eradicate. A detailed review of patient care and outcomes is underway as part of the MSGERC long-term follow-up study.

*Additional information available at http://www.cdc.gov/hai/outbreaks/meningitis.html.

†Additional information available at http://www.cdc.gov/hai/outbreaks/patients/index.html.

Acknowledgments

The collaborating Multistate Fungal Infection Outbreak Response Team; Multistate Fungal Infection Clinical Investigation Team; clinical providers.

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References

1. Smith RM, Schaefer MK, Kainer MA, et al. Fungal infections associated with contaminated methylprednisolone injections. N Engl J Med 2013;369:1598–609.
2. Litvintseva AP, Lindsley MD, Gade L, et al. Utility of (1-3)-β-D-glucan testing for diagnostics and monitoring response to treatment during the multistate outbreak of fungal meningitis and other infections. Clin Infect Dis 2014;58:622–30.
3. Malani AN, Singal B, Wheat LJ, et al. (1,3)-β-D-glucan in cerebrospinal fluid for diagnosis of fungal meningitis associated with contaminated methylprednisolone injections. J Clin Microbiol 2015;53:799–803.

Notes from the Field

Outbreak of *Escherichia coli* O157:H7 Infections Associated with Dairy Education Event Attendance — Whatcom County, Washington, 2015

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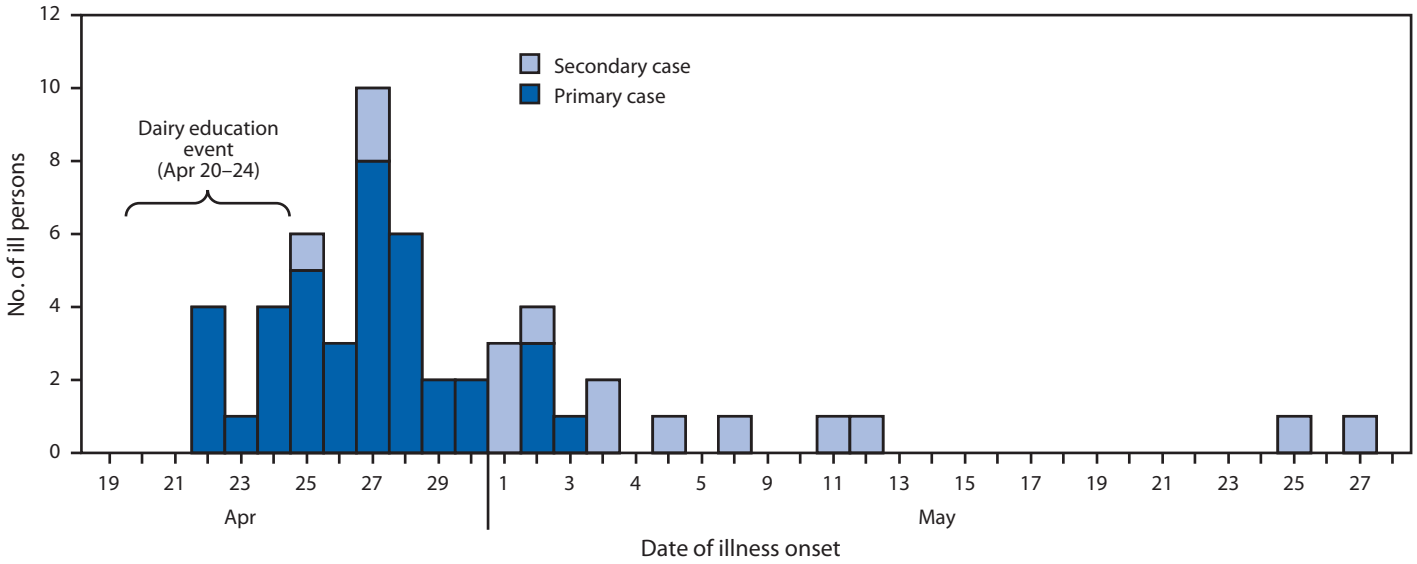
On April 27, 2015, the Whatcom County Health Department (WCHD) in Bellingham, Washington, was notified by a local laboratory regarding three children with presumptive *Escherichia coli* O157 infection. WCHD interviewed the parents, who indicated that all three children had attended a dairy education event held in a barn April 20–24, 2015, during a school field trip. WCHD, the Washington State Department of Health, and CDC investigated to determine the magnitude of the outbreak, identify risk factors and potential environmental sources of infection, and develop recommendations. A total of 60 cases (25 confirmed and 35 probable) were identified, and 11 patients were hospitalized.

Shiga-toxin producing *E. coli* infection is a notifiable condition in Washington. WCHD issued a health alert and notified local laboratories, school nurses, parents, and event organizers of the outbreak. WCHD and the state health department interviewed patients with confirmed *E. coli* infection and others who reported diarrheal illness about their attendance at the dairy education event. PulseNet, the national molecular subtyping laboratory network for foodborne disease surveillance, used pulsed-field gel electrophoresis (PFGE) to identify outbreak strains. A confirmed case of *E. coli* O157:H7 infection was defined as laboratory confirmation of infection with the outbreak strains or physician-diagnosed hemolytic uremic syndrome in a person with diarrheal illness onset during April 20–June 1, who had attended the dairy event or had close contact with someone who had attended the event. A probable case was defined as diarrheal illness in a person with onset during April 20–June 1, who had attended the event or had close contact with someone who attended the event. Confirmed and probable cases were classified as primary (patient attended the event) or secondary (patient was a contact of someone who attended the event). Environmental testing of the barn was conducted; bacterial isolates were compared with patient isolates using PFGE.

During April 20–June 1, 2015, 60 cases (25 confirmed and 35 probable) were identified (Figure). Eleven (18%) patients were hospitalized, and six (10%) developed hemolytic uremic syndrome. No deaths occurred. Forty primary cases were identified in 35 first-graders, three high school students, one parent, and one teacher who attended the event. Twenty secondary cases were identified in 14 siblings, four caretakers, and two cousins of attendees.

Food was served inside the barn to adolescents who set up and broke down the event on April 20 and April 24. During April 21–23 approximately 1,000 first-grade students attended

FIGURE. Number of persons (N = 54) infected with the outbreak strains of *Escherichia coli* O157:H7, by date of illness onset and dairy education event attendance — Whatcom County, Washington, April 20–June 1, 2015*



* Six additional patients (one primary, five secondary) were ill during April 20–June 1, but exact illness onset dates were unknown.

the event, which included various activities related to farming. Crude attack rates were higher among those who assisted with setup on April 20 or breakdown on April 24 (three of 14 high school students; 21%) and among attendees on April 21 (22 of 254 students; 9%), than among attendees on April 22 (six of 377 students; 2%) and April 23 (seven of 436 students; 2%).

Animals, including cattle, had been exhibited in the barn during previous events. Before the dairy education event, tractors, scrapers, and leaf blowers were used to move manure to a bunker at the north end of the barn. Environmental samples collected in this area yielded *E. coli* O157:H7 PFGE patterns indistinguishable from the outbreak strains.

This investigation highlighted the importance of implementing infection prevention measures at events held in venues with animals or where animals had been present. Students attending the setup and breakdown might have had higher rates of illness because they consumed food in the barn and might not have washed their hands before eating. Facility cleaning procedures and location of the manure bunker (inside the barn) might have contributed to an increased risk for infection among the attendees.

Although it might not be possible to completely disinfect barns and areas where animals have been kept, standard procedures for cleaning, disinfection, and facility design should be adopted to minimize the risk for exposure to pathogens (*1*). These environments should be considered contaminated and should not be located in areas where food and beverages are served. Hands should always be washed with soap and clean running water, and dried with clean towels immediately upon exiting areas containing animals or where animals have been kept previously, after removing soiled clothing or shoes, and before eating or drinking (*2*). Event organizers can refer to published recommendations for preventing disease associated with animals in public settings (*1*).

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References

1. National Association of State Public Health Veterinarians. Compendium of measures to prevent disease associated with animals in public settings. J Am Vet Med Assoc 2013;243:1270–88.
2. CDC. Show me the science—how to wash your hands. Atlanta, GA: US Department of Health and Human Services, CDC; 2015. Available at http://www.cdc.gov/handwashing/show-me-the-science-handwashing.html.

Announcement

Recommendation Regarding Education Programs and Policies to Promote Health Equity from the Community Preventive Services Task Force

The Community Preventive Services Task Force recently posted new information on its website entitled, "Promoting Health Equity Through Education Programs and Policies: Center-Based Early Childhood Education." The information is available at http://www.thecommunityguide.org/healthequity/education/centerbasedprograms.html.

Established in 1996 by the U.S. Department of Health and Human Services, the task force is an independent, nonfederal, uncompensated panel of public health and prevention experts whose members are appointed by the Director of CDC. The task force provides information for a wide range of decision makers on programs, services, and policies aimed at improving population health. Although CDC provides administrative, research, and technical support for the task force, the recommendations developed are those of the task force and do not undergo review or approval by CDC.

Erratum

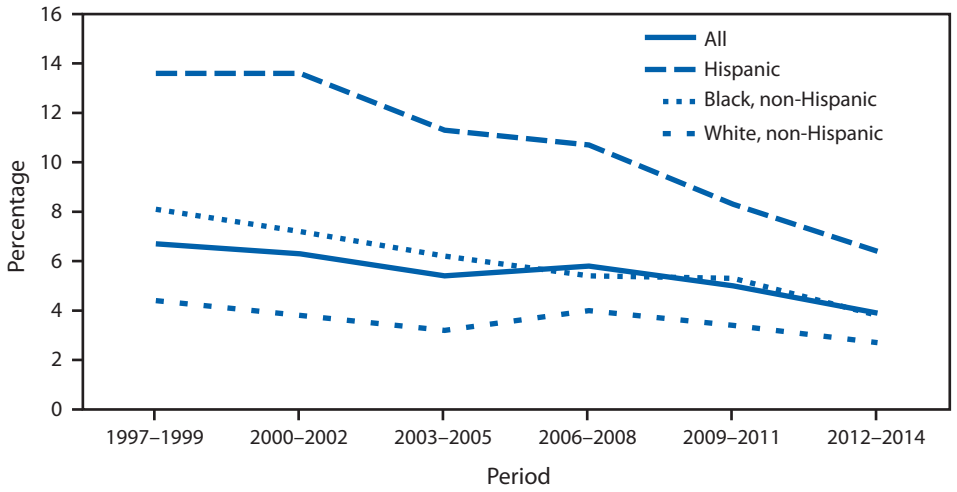
Vol. 64, No. 34

In the report, "Intervals Between PCV13 and PPSV23 Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP)," the Box Notes contained an error. The Notes should have read as follows: **"For immunocompetent adults who previously received PPSV23 when aged <65 years and for whom an additional dose of PPSV23 is indicated when aged ≥65 years, this subsequent PPSV23 dose should be given ≥1 year after PCV13 and ≥5 years after the most recent dose of PPSV23. For adults aged ≥65 years with immunocompromising conditions, functional or anatomic asplenia, cerebrospinal fluid leaks, or cochlear implants, the recommended interval between PCV13 followed by PPSV23 is ≥8 weeks."**

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Children and Adolescents Aged 0–17 Years with No Usual Place of Health Care,* by Race† and Hispanic Ethnicity — National Health Interview Survey, United States, 1997–2014§



* Children and adolescents were defined as having no usual place of health care if a knowledgeable adult answered "no" to the question "Is there a place that the child goes when he or she is sick or you need advice about his or her health?" or answered "yes" and responded "emergency room" to the question, "What kind of place (do you go to most often): a clinic, doctor's office, emergency room, or some other place?"

† All indicates persons of all races and ethnicities, not just those shown separately.

§ Estimates were derived from the National Health Interview Survey sample child component, based on household interviews with a national sample of the civilian, noninstitutionalized U.S. population.

During 2012–2014, 3.9% of children and adolescents aged 0–17 years had no usual place of health care compared with 6.7% during 1997–1999. From 1997–1999 to 2012–2014 the percentage of children and adolescents with no usual place of care declined for Hispanics (from 13.6% to 6.4%) and non-Hispanic blacks (from 8.1% to 3.8%). The change for non-Hispanic whites from 4.4% during 1997–1999 to 2.7% during 2012–2014 was not statistically significant. Hispanic children and adolescents were more likely than non-Hispanic white or non-Hispanic black children and adolescents to have no usual place of health care during 1997–2014.

Sources: National Health Interview Survey. Available at http://www.cdc.gov/nchs/nhis.htm. CDC. Health data interactive. Available at http://www.cdc.gov/nchs/hdi.htm.

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ISSN: 0149-2195 (Print)