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Travel-Associated and Locally Acquired Dengue Cases — United States, 2010–2017

Aidsa Rivera, MS[1]; Laura E. Adams, DVM[1]; Tyler M. Sharp, PhD[1]; Jennifer A. Lehman[2]; Stephen H. Waterman, MD[1]; Gabriela Paz-Bailey, MD, PhD[1]

Dengue is a potentially fatal acute febrile illness caused by any of four mosquito-transmitted dengue viruses (DENV-1 to DENV-4) belonging to the family *Flaviviridae* and endemic throughout the tropics. Competent mosquito vectors of DENV are present in approximately one half of all U.S. counties. To describe epidemiologic trends in travel-associated and locally acquired dengue cases in the United States, CDC analyzed cases reported from the 50 states and District of Columbia to the national arboviral surveillance system (ArboNET). Cases are confirmed by detection of 1) virus RNA by reverse transcription–polymerase chain reaction (RT-PCR) in any body fluid or tissue, 2) DENV antigen in tissue by a validated assay, 3) DENV nonstructural protein 1 (NS1) antigen, or 4) immunoglobulin M (IgM) anti-DENV antibody if the patient did not report travel to an area with other circulating flaviviruses. When travel to an area with other flaviviruses was reported, IgM-positive cases were defined as probable. During 2010–2017, totals of 5,009 (93%) travel-associated and 378 (7%) locally acquired confirmed or probable dengue cases were reported to ArboNET. Cases were equally distributed between males and females, and median age was 41 years. Eighteen (three per 1,000) fatal cases were reported, all among travelers. Travelers should review country-specific recommendations (https://wwwnc.cdc.gov/travel/notices/watch/dengue-asia) for reducing their risk for DENV infection, including using insect repellent and staying in residences with air conditioning or screens on windows and doors.

DENV infection can be asymptomatic or cause disease ranging from a febrile illness with headache, myalgia, arthralgia, and rash, to potentially fatal manifestation of severe dengue, including plasma leakage, hemorrhage, or severe organ impairment. The four DENVs are endemic throughout the tropics and are common causes of acute febrile illness in travelers (*1*). Globally, the number of dengue cases doubled each decade from 1990 to 2013, reaching an estimated maximum of 390 million (95% credible interval [CI]* = 284–528) DENV infections in 2010, 96 million (95% CI = 67–136) of which resulted in symptomatic cases (*2*). An estimated average of 13,600 (95% uncertainty interval [UI]† = 4,200–34,700) persons die from dengue every year (*3*). The geographic range of dengue is expected to further expand as a result of rising world temperatures and urbanization (*4*). Infection with a DENV produces long-lasting immunity to that virus; however, persons later infected with another DENV can be at increased risk for developing severe dengue (*5*).

* Differs from a confidence interval; a credible interval is the interval in which an unobserved parameter has a given probability, dependent on the prior distribution.
† Another term for confidence interval.

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Although multiple behavioral, environmental, and entomologic approaches have been implemented to control *Aedes* spp. mosquito populations, none has yet proven to be both sustainable and effective. No specific treatment for dengue exists. The first Food and Drug Administration–approved vaccine against dengue, Dengvaxia, is licensed for use in approximately 20 countries, and was recently approved for use in the United States in children aged 9–16 years who have laboratory evidence of prior DENV infection and who live in areas with endemic DENV (*6*). The Advisory Committee on Immunization Practices has not yet issued recommendations for Dengvaxia use in the United States. Other candidate vaccines are undergoing clinical trials.

In 2010, dengue became a nationally notifiable disease; state and territorial health departments report dengue cases to CDC through ArboNET (https://www.cdc.gov/dengue/statistics-maps/index.html; https://wwwn.cdc.gov/nndss/conditions/dengue/). This report describes locally acquired and travel-associated, laboratory-confirmed and probable dengue cases reported to ArboNET from the 50 states and District of Columbia with illness onset during January 1, 2010–December 31, 2017.

Dengue cases were described according to the Council of State and Territorial Epidemiologists case definitions (*7*). Confirmed cases met the clinical criteria and had detection of 1) DENV nucleic acid by RT-PCR in any body fluid or tissue, 2) DENV antigen in tissue by a validated assay, 3) DENV NS1 antigen by a validated immunoassay, or 4) IgM anti-DENV antibody if exposure occurred in an area without evidence of other flavivirus transmission. Probable dengue cases met the clinical criteria and were defined by detection of IgM anti-DENV antibody in serum if the person lived in or traveled to an area with transmission of another flavivirus. The infecting DENV was determined by molecular typing by RT-PCR (https://www.cdc.gov/dengue/healthcare-providers/testing/molecular-tests/index.html). Travel destinations were recorded as the areas visited outside the continental United States in the 14 days before illness onset, considered as the most likely locations of infection. The incidence of dengue cases among U.S. outbound travelers was calculated using denominator data from the National Travel and Tourism Office.[§] Travelers to Europe were excluded from the denominator because of the small number of dengue cases reported from Europe.

During 2010–2017, a total of 5,387 dengue cases were reported to ArboNET, 5,009 (93%) of which were travel-associated; 378 (7%) were locally acquired (Table 1). Two thirds were probable cases. Cases were equally distributed between males and females, and the median patient age was 41 years. Nearly half (46%) of patients were white, and 14% were Asian. Among 459 cases for which the infecting DENV was identified, DENV-1 (308 cases, 67%) was the most common (Table 2). The largest number of dengue cases (961, 18%) was reported in 2016, and the smallest (254, 5%) in 2011.

[§] https://travel.trade.gov/research/monthly/departures/.

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TABLE 1. Reported number of travel-associated dengue cases, by state — United States, 2010–2017

State	Travel-associated cases No. (%)
Alabama	28 (1)
Alaska	14 (0)
Arizona	153 (3)
Arkansas	11 (0)
California	819 (16)
Colorado	49 (1)
Connecticut	55 (1)
Delaware	9 (0)
District of Columbia	27 (1)
Florida*	695 (14)
Georgia	75 (1)
Hawaii*	86 (2)
Idaho	13 (0)
Illinois	172 (3)
Indiana	48 (1)
Iowa	35 (1)
Kansas	25 (0)
Kentucky	11 (0)
Louisiana	33 (1)
Maine	14 (0)
Maryland	69 (1)
Massachusetts	38 (1)
Michigan	87 (2)
Minnesota	115 (2)
Mississippi	8 (0)
Missouri	36 (1)
Montana	19 (0)
Nebraska	13 (0)
Nevada	21 (0)
New Hampshire	13 (0)
New Jersey	249 (5)
New Mexico	11 (0)
New York*	878 (18)
North Carolina	65 (1)
North Dakota	6 (0)
Ohio	65 (1)
Oklahoma	19 (0)
Oregon	21 (0)
Pennsylvania	137 (3)
Rhode Island	24 (0)
South Carolina	40 (1)
South Dakota	10 (0)
Tennessee	47 (1)
Texas*	267 (5)
Utah	14 (0)
Vermont	19 (0)
Virginia	140 (3)
Washington	127 (3)
West Virginia	6 (0)
Wisconsin	72 (1)
Wyoming	1 (0)
Total	**5,009**

* In addition to travel-associated cases, these four states reported a total of 378 locally acquired cases: Hawaii (250 cases), Florida (103), Texas (24), and New York (one).

The average annual number of travel-associated dengue cases was 626, and the average annual incidence was 16 cases per 1 million U.S. travelers (range = 7–28).

Summary

What is already known about this topic?

The four dengue viruses are transmitted by *Aedes* spp. mosquitoes and are common causes of acute febrile illness in travelers visiting the tropics.

What is added by this report?

During 2010–2017, a total of 5,387 dengue cases were reported from U.S. states; 93% were travel-associated. Locally acquired cases were reported from Hawaii (250 cases), Florida (103), Texas (24), and New York (one).

What are the implications for public health practice?

Travelers to the tropics should protect against mosquito bites by using insect repellents, wearing long-sleeved shirts and long pants, and taking actions to keep mosquitos out of their residences. Clinicians should remain vigilant for and report suspected dengue cases to local health authorities.

Approximately one half (53%) of travel-associated cases were reported from four states: New York (18%), California (16%), Florida (14%), and Texas (5%) (Table 1). Travel history was reported for 96% of cases. The most frequently reported regions of travel were the Caribbean (33%) and Asia (29%), followed by Central America (14%), North America (10%) and South America (7%) (Table 2). The most frequently reported region of travel changed from the Caribbean (42%) during 2010–2014 to Asia (35%) during 2015–2017 (Figure). The most frequently reported destinations with endemic transmission across all years were the countries of India (591, 12%), Mexico (472, 9%), and Dominican Republic (443, 9%), and the U.S. territory of Puerto Rico (343, 7%).

Hawaii reported the largest number of locally acquired dengue cases (250; 66%), followed by Florida (103; 27%), Texas (24; 6%), and New York (one; 0.3%) (Table 1). All locally acquired cases in Hawaii (98%) were reported during a 2015–2016 outbreak, whereas most cases in Florida were reported during outbreaks in Monroe County in 2010 (56 cases) and in Martin County in 2013 (17). Texas reported a small outbreak in 2013 with most cases (21) in Cameron County.

The majority of patients with travel-associated (94%) and locally acquired (94%) dengue had reported symptoms consistent with dengue; a small percentage of patients with travel-associated (<1%) and locally acquired (<1%) cases had severe dengue. Overall, 2,176 (40%) patients with dengue were hospitalized, most of whom (2,119; 97%) were travelers. Eighteen (three per 1,000) fatal dengue cases were reported, all of which occurred in travelers (Table 2). The median age of patients with fatal dengue was 47 years (range 21–80 years). Region of birth was available for two of the decedents (one each from the Pacific and Central American regions).

TABLE 2. Characteristics of reported travel-associated and locally acquired dengue cases — ArboNET, United States, 2010–2017

Characteristic	No. (%)		
	Travel-associated cases (n = 5,009)	Locally acquired cases (n = 378)	Total (N = 5,387)
Case definition			
Probable	3,539 (71)	58 (15)	3,597 (67)
Confirmed	1,470 (29)	320 (85)	1,790 (33)
Infecting DENV*			
DENV-1	119 (45)	189 (96)	308 (67)
DENV-2	71 (27)	4 (2)	75 (16)
DENV-3	45 (17)	3 (2)	48 (10)
DENV-4	28 (11)	0 (0)	28 (6)
Sex†			
Female	2,500 (50)	188 (50)	2,688 (50)
Male	2,508 (50)	190 (50)	2,698 (50)
Race			
White	2,240 (45)	245 (65)	2,485 (46)
Asian	729 (15)	24 (6)	753 (14)
Black or African American	277 (6)	5 (1)	282 (5)
Native Hawaiian or other Pacific Islander	37 (1)	72 (19)	109 (2)
American Indian or Alaska Native	16 (0)	5 (1)	21 (0)
Asian, White	2 (0)	0 (0)	2 (0)
Asian, Native Hawaiian or other Pacific Islander	0 (0)	1 (0)	1 (0)
Unknown	1,708 (34)	26 (7)	1,734 (32)
Age group (yrs)§			
0–9	129 (3)	14 (4)	143 (3)
10–19	515 (10)	46 (12)	561 (10)
20–29	887 (18)	67 (18)	954 (18)
30–39	847 (17)	43 (11)	890 (17)
40–49	897 (18)	70 (19)	967 (18)
50–59	904 (18)	57 (15)	961 (18)
60–69	574 (11)	56 (15)	630 (12)
≥70	246 (5)	24 (6)	270 (5)
Region of travel			
Caribbean	1,649 (33)	—	1,649 (33)
Asia	1,469 (29)	—	1,469 (29)
Central America	676 (14)	—	676 (14)
North America¶	477 (10)	—	477 (10)
South America	327 (7)	—	327 (7)
Unknown	222 (4)	—	222 (4)
Africa	89 (2)	—	89 (2)
Oceania	85 (2)	—	85 (2)
Europe	7 (<1)	—	7 (<1)
Multiple regions	8 (<1)	—	8 (<1)

See table footnotes on the next page.

Discussion

Most dengue cases reported in the 50 states and District of Columbia during 2010–2017 were in adults and were associated with travel to the Caribbean and Asia. Travel-associated cases were reported primarily from New York, California, Florida, and Texas. The most common travel destinations shifted over time, underscoring the importance of travelers being vigilant and reviewing current dengue trends before travel (https://wwwnc.cdc.gov/travel). Locally acquired cases occurred in four states, three of which (Florida, Hawaii, and Texas) also experienced local outbreaks. These data, especially the comparatively large outbreak in Hawaii, demonstrate the ongoing risk for local DENV transmission in *Aedes*-infested areas of the United States following introduction by travelers returning from the tropics.

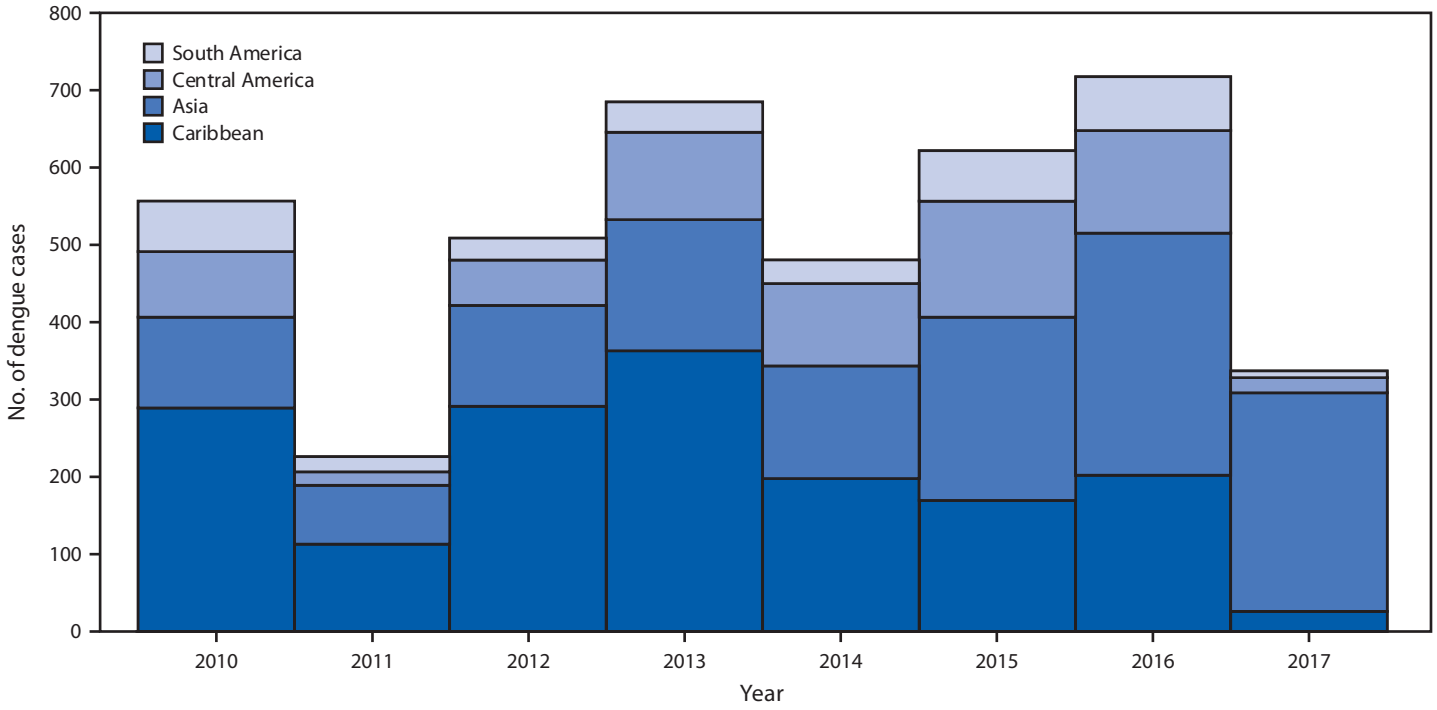
Competent mosquito vectors of DENV are present in approximately half of all U.S. counties, and an estimated 71% of counties are environmentally suitable for *Aedes aegypti*, the most efficient DENV vector (*8*). Recent dengue outbreaks in the United States have been limited, likely because of lifestyle differences, including the use of screens in U.S. homes and air conditioning that limit exposure to mosquitoes (*9*). However, the trend toward more frequent travel of U.S. residents to the tropics increases the possibility of local dengue outbreaks, including in jurisdictions where local cases have not occurred

TABLE 2. (*Continued*) Characteristics of reported travel-associated and locally acquired dengue cases — ArboNET, United States, 2010–2017

Characteristic	No. (%)		
	Travel-associated cases (n = 5,009)	Locally acquired cases (n = 378)	Total (N = 5,387)
Clinical syndrome**			
Dengue††	4,597 (94)	353 (94)	4,950 (94)
Dengue-like illness§§	254 (5)	24 (6)	278 (5)
Severe dengue¶¶	46 (<1)	1 (<1)	47 (<1)
Outcome			
Hospitalized	2,119 (42)	57 (15)	2,176 (40)
Died	18 (<1)	0	18 (<1)

* Not available before 2014 (n = 459).
† One unknown sex among travelers.
§ Ten unknown age group among travelers and one among locally acquired cases.
¶ 99% of patients (472) traveled to Mexico.
** National Notifiable Diseases Surveillance System (NNDSS) dengue definitions from 2010 and 2015. Dengue hemorrhagic fever and dengue shock syndrome cases were classified as severe dengue in this analysis; dengue fever and dengue fever with hemorrhage cases were classified as dengue. https://wwwn.cdc.gov/nndss/conditions/dengue-virus-infections/case-definition/2015/.
†† Dengue is defined by fever as reported by the patient or health care provider and the presence of one or more of the following signs and symptoms: nausea/vomiting, rash, aches and pains (e.g., headache, retro-orbital pain, joint pain, myalgia, or arthralgia), tourniquet test positive, leukopenia (a total white blood cell count of <5,000/mm^3), or any warning sign for severe dengue: abdominal pain or tenderness, persistent vomiting, extravascular fluid accumulation (e.g., pleural or pericardial effusion or ascites), mucosal bleeding at any site, liver enlargement >2 cm, or increasing hematocrit concurrent with rapid decrease in platelet count.
§§ Dengue-like illness (59 cases) was combined with febrile illness (two), and uncomplicated fever (217); 91 cases with unknown clinical syndrome and 21 classified as other clinical syndrome were excluded, all of them were travel-associated.
¶¶ Severe dengue is defined as dengue with any one or more of the following: 1) severe plasma leakage evidenced by hypovolemic shock or extravascular fluid accumulation (e.g., pleural or pericardial effusion or ascites) with respiratory distress; 2) severe bleeding from the gastrointestinal tract (e.g., hematemesis or melena) or vagina (menorrhagia) as defined by requirement for medical intervention including intravenous fluid resuscitation or blood transfusion, or 3) severe organ involvement, including any of the following: elevated liver transaminases: aspartate aminotransferase or alanine aminotransferase ≥1,000 per liter (U/L), impaired level of consciousness or diagnosis of encephalitis, encephalopathy, or meningitis, or heart or other organ involvement including myocarditis, cholecystitis, and pancreatitis.

FIGURE. Number of travel-associated dengue cases in U.S. residents, by reported travel destination and year of illness onset — 2010–2017



in recent years (*4*). The number of travel-associated dengue cases peaked at approximately 900 in 2016 and could increase if large dengue epidemics occur in the Region of the Americas. Dengue surveillance is a critical public health task because of the presence of *Aedes aegypti* in many jurisdictions and the risk for virus introduction. Although dengue incidence in travelers is low, health agencies must remain vigilant because most cases are asymptomatic and reported cases represent a small percentage of all infections.

The findings in this report are subject to at least three limitations. First, reporting of dengue symptoms was incomplete. Second, the clinical features of dengue are similar to those for other acute febrile illnesses, including chikungunya and Zika virus disease, which complicates identification, diagnostic testing, and reporting of dengue patients and likely results in an underestimate of the true incidence of travel-associated and locally acquired dengue cases. In addition, the case definition was modified in 2015 to classify dengue hemorrhagic fever and dengue shock syndrome as severe dengue and dengue fever and dengue fever with hemorrhage as dengue (*7*); thus, annual trends might not be comparable.

Dengue is endemic in South and Central America, the Caribbean, Southeast Asia, and central Africa, and more than half of the global population live in areas that are suitable for DENV transmission (*4*). Travelers to and residents of areas with risk for DENV infection should implement personal protection measures to avoid mosquito bites, including using insect repellent, wearing long pants and long sleeves, and staying in residences with air conditioning or screened windows and doors.¶ When conducting pretravel consultations, clinicians should include discussion of dengue risk, mosquito avoidance strategies, and advice about seeking health care for febrile illnesses occurring during or after travel. Clinicians should consider dengue when evaluating patients with acute febrile illness and recent travel to the tropics and should consider recommended diagnostic testing (*10*). Suspected dengue cases should be reported to public health authorities to enable timely responses.

¶ https://wwwnc.cdc.gov/travel/diseases/dengue.

Corresponding author: Aidsa Rivera, erj2@cdc.gov, 787-706-2257.

[1]Division of Vector-Borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC, San Juan, Puerto Rico; [2]Division of Vector-Borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC, Fort Collins, Colorado.

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State Medicaid Coverage for Tobacco Cessation Treatments and Barriers to Accessing Treatments — United States, 2008–2018

Anne DiGiulio[1]; Zach Jump, MA[1]; Stephen Babb, MPH[2]; Anna Schecter, MPH[2]; Kisha-Ann S. Williams, MPH[2]; Debbie Yembra, MPH[2]; Brian S. Armour, PhD[2]

The prevalence of current cigarette smoking is approximately twice as high among adults enrolled in Medicaid (23.9%) as among privately insured adults (10.5%), placing Medicaid enrollees at increased risk for smoking-related disease and death (*1*). Medicaid spends approximately $39 billion annually on treating smoking-related diseases (*2*). Individual, group, and telephone counseling and seven Food and Drug Administration (FDA)–approved medications* are effective in helping tobacco users quit (*3*). Comprehensive, barrier-free, widely promoted coverage of these treatments increases use of cessation treatments and quit rates and is cost-effective (*3*). To monitor changes in state Medicaid cessation coverage for traditional Medicaid enrollees† over the past decade, the American Lung Association collected data on coverage of nine cessation treatments by state Medicaid programs during December 31, 2008–December 31, 2018: individual counseling, group counseling, and the seven FDA-approved cessation medications§; states that cover all nine of these treatments are considered to have comprehensive coverage. The American Lung Association also collected data on seven barriers to accessing covered treatments.¶ As of December 31, 2018, 15 states covered all nine cessation treatments for all enrollees, up from six states as of December 31, 2008. Of these 15 states, Kentucky and Missouri were the only ones to have removed all seven barriers to accessing these cessation treatments. State Medicaid programs that cover all evidence-based cessation treatments, remove barriers to accessing these treatments, and promote covered treatments to Medicaid enrollees and health care providers could reduce smoking, smoking-related disease, and smoking-attributable federal and state health care expenditures (*3*–*7*).

During December 31, 2008–December 31, 2018, the American Lung Association compiled data on state Medicaid tobacco cessation coverage from state Medicaid and Medicaid managed care plan member and provider websites and handbooks, policy manuals, plan formularies and preferred drug lists; Medicaid state plan amendments; and relevant regulations and laws.** Analysts searched for mentions of the nine cessation treatments on state Medicaid websites and other relevant state-sponsored websites and the Google search engine. The American Lung Association contacted personnel from state Medicaid agencies, state health departments, or other state government agencies to verify the information collected, retrieve missing documents, and reconcile discrepancies.

As of December 31, 2018, all 50 states and the District of Columbia (DC) covered at least some cessation treatments for all traditional Medicaid enrollees, compared with 46 states and DC as of December 31, 2008. As of December 31, 2018, 16 states covered both individual and group counseling for all enrollees, up from 13 states in December 2008 (Table 1). Thirty-six states†† covered all seven FDA-approved cessation medications for all traditional Medicaid enrollees, up from 20 states in December 2008 (Table 2). As of December 31, 2018, 15 states (California, Colorado, Connecticut, Indiana, Kansas, Kentucky, Maine, Massachusetts, Minnesota, Missouri, Ohio, Oregon, Rhode Island, South Carolina, and Wisconsin) covered all nine cessation treatments for all traditional Medicaid enrollees, an increase from six states as of December 31, 2008 (Table 1) (Table 2). Eleven states (California, Colorado, Connecticut, Kansas, Kentucky, Maine, Missouri, Ohio, Rhode Island, South Carolina, and Wisconsin) achieved this comprehensive level of coverage during the study period.

* FDA has approved seven medications for smoking cessation, including five nicotine replacement therapies (the nicotine patch, gum, lozenge, nasal spray, and inhaler) and two nonnicotine medications (bupropion and varenicline).

† As used in this report, the term "traditional" Medicaid enrollees refers to persons who are enrolled in Medicaid under traditional Medicaid eligibility criteria (e.g., low-income pregnant women, children and persons with a disability), as opposed to the income-only eligibility criteria (i.e. income equal or less than 138% of the federal poverty level) for coverage under expanded Medicaid, created by the Patient Protection and Affordable Care Act and implemented in 2014. https://www.healthcare.gov/medicaid-chip/getting-medicaid-chip/.

§ Telephone counseling is available free to callers to state quitlines (including Medicaid enrollees) in all 50 states and DC through the national quitline portal 1-800-QUIT-NOW and was not included in this report. In June 2011, the Centers for Medicare & 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.

¶ These seven coverage barriers are requirement of copayment, requirement of prior authorization, requirement of counseling for medications, stepped care therapy, limits on duration, annual limit on number of covered quit attempts, and lifetime limit on number of covered quit attempts. States were considered to have a barrier if that barrier was in place for one or more cessation treatments.

** Information on state Medicaid cessation coverage compiled by the American Lung Association is available in 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 (https://www.cdc.gov/statesystem). Certain data presented in this report differ slightly from Medicaid cessation coverage data reported in the STATE System because of small differences in coding rules, categories, and reporting periods.

†† As used in this report, the term "states" includes DC.

TABLE 1. Medicaid coverage for tobacco cessation counseling, by state — United States, 2008 and 2018*,†

State	Individual counseling		Group counseling	
	2008	2018	2008	2018
Alabama	P	P	No	No
Alaska	Yes	Yes	No	No
Arizona	No	P	No	No
Arkansas	Yes	Yes	Yes	No
California	Yes	Yes	V	Yes
Colorado	No	Yes	No	Yes
Connecticut	No	Yes	No	Yes
Delaware	No	Yes	No	No
District of Columbia	V	Yes	V	No
Florida	Yes	V	Yes	V
Georgia	No	Yes	No	V
Hawaii	No	Yes	V	V
Idaho	No	Yes	Yes	No
Illinois	No	V	No	No
Indiana	Yes	Yes	Yes	Yes
Iowa	Yes	V	No	V
Kansas	No	Yes	No	Yes
Kentucky	P	Yes	No	Yes
Louisiana	No	Yes	No	V
Maine	Yes	Yes	No	Yes
Maryland	Yes	Yes	Yes	No
Massachusetts	Yes	Yes	Yes	Yes
Michigan	V	Yes	V	V
Minnesota	Yes	Yes	Yes	Yes
Mississippi	P	P	P	V
Missouri	No	Yes	No	Yes
Montana	Yes	Yes	No	No
Nebraska	Yes	Yes	Yes	V
Nevada	Yes	V	Not available	V
New Hampshire	Yes	Yes	P	V
New Jersey	Yes	V	Yes	V
New Mexico	No	V	V	V
New York	P	Yes	P	Yes
North Carolina	No	Yes	No	No
North Dakota	Yes	P	Yes	No
Ohio	No	Yes	No	Yes
Oklahoma	Yes	Yes	No	No
Oregon	Yes	Yes	Yes	Yes
Pennsylvania	Yes	Yes	Yes	V
Rhode Island	Yes	Yes	Yes	Yes
South Carolina	No	Yes	No	Yes
South Dakota	No	P	No	No
Tennessee	No	V	No	No
Texas	V	V	Not available	V
Utah	P	Yes	P	P
Vermont	No	Yes	No	No
Virginia	No	V	P	V
Washington	Yes	V	No	No
West Virginia	No	Yes	V	V
Wisconsin	Yes	Yes	Yes	Yes
Wyoming	Yes	Yes	No	No
Totals				
Yes	**23**	**36**	**14**	**16**
No	**20**	**0**	**24**	**18**
V	**3**	**10**	**6**	**16**
P	**5**	**5**	**5**	**1**
Not available	**0**	**0**	**2**	**0**

Abbreviations: No = treatment not covered for any Medicaid enrollee; P = treatment covered for pregnant women only; V = coverage varies, with treatment covered for some, but not all, traditional Medicaid enrollees; Yes = treatment covered for all Medicaid enrollees.

* Data as of December 31, 2008, and December 31, 2018.

† Because of differences in the methods and timing of data collection, some findings differ from findings on this topic published before 2014.

Conversely, two states (Nebraska and Pennsylvania) that covered all nine cessation treatments in December 2008 no longer did so in December 2018.§§ Thirteen (87%) of the 15 states that covered all nine cessation treatments in 2018 had barriers in place for some treatments (Table 3); the remaining two states (Kentucky and Missouri) have removed all seven barriers examined in this study.

The number of states having none of the seven barriers to cessation treatment increased from zero to two during December 31, 2008–December 31, 2018. During this period, the number of states that did not require copayments for any cessation treatment for any traditional Medicaid enrollees approximately tripled, from 10 to 28. As of December 31, 2018, states reported that the most common barriers imposed on all or some traditional Medicaid enrollees were limits on duration of treatment (44 states, 86%), annual limits on quit attempts (37, 72%), and prior authorization requirements (35, 69%) (Table 3).

§§ These states are no longer considered to provide comprehensive Medicaid cessation coverage because of changes in coverage in their Medicaid managed care plans.

Discussion

States made substantial progress in improving Medicaid coverage of proven tobacco cessation treatments during 2008–2018, with the number of states covering all nine cessation treatments for all traditional Medicaid enrollees increasing from six to 15 and the number of states covering all seven FDA-approved cessation medications increasing from 20 to 36. Improved coverage increases Medicaid enrollees' access to cessation treatments, which can make it easier for them to quit smoking (*3*,*5*,*6*). Covering all nine cessation treatments is important because different smokers respond better to or prefer different treatments than do other smokers.

The increase in the number of states covering all nine cessation treatments likely resulted in part from the Patient Protection and Affordable Care Act (ACA), which was passed in March 2010 (*3*). Two provisions of the ACA that introduced new requirements for state Medicaid cessation coverage took effect during the study period. The first provision, which took effect in October 2010, requires state Medicaid programs to cover cessation counseling and FDA-approved cessation

TABLE 2. Medicaid coverage for tobacco cessation medications, by state — United States, 2008 and 2018*,†

	NRT patch		NRT gum		NRT lozenge		NRT nasal spray		NRT inhaler		Bupropion (Zyban)		Varenicline (Chantix)	
State	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**	**2008**	**2018**
Alabama	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Alaska	Yes	Yes	Yes	Yes	Yes	Yes	Yes	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	V	Yes	V	Yes	V	Yes	V	Yes	Yes	Yes	V	Yes
Colorado	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Connecticut	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Delaware	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
District of Columbia	V	Yes	V	Yes	V	Yes	No	V	No	V	V	Yes	V	V
Florida	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	No	Yes
Georgia	No	Yes	No	Yes	No	Yes	No	V	No	V	No	Yes	No	V
Hawaii	V	Yes	V	Yes	V	V	V	V	V	V	V	Yes	V	Yes
Idaho	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Illinois	Yes	Yes	Yes	Yes	Yes	Yes	Yes	V	Yes	V	Yes	Yes	Yes	V
Indiana	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iowa	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Kansas	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Kentucky	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Louisiana	Yes	Yes	Yes	Yes	No	Yes	Yes	V	Yes	V	Yes	Yes	Yes	V
Maine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maryland	V	Yes	V	Yes	V	Yes	No	Yes	No	Yes	V	Yes	V	Yes
Massachusetts	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Michigan	Yes	Yes	V	Yes	V	Yes	V	Yes	V	Yes	V	Yes	V	Yes
Minnesota	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mississippi	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Missouri	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Montana	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nebraska	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nevada	Yes	Yes	Yes	Yes	Yes	Yes	Yes	V	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	V	Yes	No	Yes	No	V	No	V	V	Yes	V	Yes
New Mexico	V	Yes	V	Yes	V	Yes	V	V	V	V	V	Yes	V	Yes
New York	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	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	No	Yes	No	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	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pennsylvania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	V	Yes	V	Yes	Yes	Yes	Yes
Rhode Island	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	V	Yes	V	Yes
South Carolina	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
South Dakota	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Tennessee	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Texas	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utah	V	Yes	V	Yes	V	Yes	V	Yes	V	Yes	Yes	Yes	Yes	Yes
Vermont	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Virginia	Yes	Yes	Yes	Yes	Yes	V	Yes	V	Yes	V	Yes	Yes	Yes	Yes
Washington	Yes	Yes	Yes	Yes	No	Yes	No	V	No	V	Yes	Yes	Yes	V
West Virginia	V	Yes	V	Yes	V	Yes	V	Yes	V	Yes	No	Yes	No	Yes
Wisconsin	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wyoming	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Totals														
Yes	**38**	**50**	**34**	**50**	**25**	**47**	**28**	**37**	**27**	**37**	**36**	**51**	**35**	**46**
No	**7**	**1**	**8**	**1**	**18**	**2**	**17**	**3**	**18**	**3**	**8**	**0**	**8**	**0**
V	**6**	**0**	**9**	**0**	**8**	**2**	**6**	**11**	**6**	**11**	**7**	**0**	**8**	**5**

Abbreviations: No = treatment not covered for any Medicaid enrollee; NRT = nicotine replacement therapy; V = coverage varies, with treatment covered for some, but not all, traditional Medicaid enrollees; Yes = treatment covered for all Medicaid enrollees.

* Data as of December 31, 2008, and December 31, 2018.

† Because of differences in the methods and timing of data collection, some findings differ from findings on this topic published before 2014.

TABLE 3. Barriers to Medicaid coverage for tobacco cessation treatments, by state — United States, 2008 and 2018*,†,§

State	Copayment required		Prior authorization required		Counseling required for medications		Stepped care therapy		Limits on duration		Annual limit on number of quit attempts		Lifetime limit on number of quit attempts	
	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018
Alabama	No	No	Yes	Yes	N/A	No	N/A	No	Yes	Yes	No	Yes	No	No
Alaska	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	No
Arizona	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	No	No
Arkansas	No	No	Yes	Yes	Yes	Yes	No	No	Yes	V	Yes	Yes	No	No
California	Yes	No	No	V	Yes	No	No	No	Yes	V	Yes	V	No	No
Colorado	Yes	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No
Connecticut	N/A	No	N/A	Yes	N/A	No	N/A	No	N/A	Yes	N/A	No	N/A	No
Delaware	Yes	No	Yes	V	Yes	V	Yes	V	Yes	V	Yes	V	No	No
District of Columbia	No	V	No	V	No	No	No	No	Yes	V	No	V	No	No
Florida	Yes	V	No	No	No	No	Yes	No	V	Yes	V	Yes	V	No
Georgia	N/A	V	N/A	V	N/A	No	N/A	No	N/A	Yes	N/A	Yes	N/A	No
Hawaii	V	No	V	V	V	Yes	V	V	V	V	V	Yes	V	No
Idaho	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	No
Illinois	No	V	Yes	V	No	No	No	V	No	V	No	V	No	No
Indiana	Yes	Yes	No	V	Yes	Yes	Yes	V	Yes	Yes	Yes	Yes	No	No
Iowa	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
Kansas	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Kentucky	No	No	No	No	N/A	No	N/A	No	Yes	No	No	No	No	No
Louisiana	Yes	V	No	V	Yes	No	No	No	No	V	No	V	No	No
Maine	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
Maryland	V	No	V	Yes	V	No	V	Yes	V	Yes	V	No	V	No
Massachusetts	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	No	Yes	No	No
Michigan	V	No	V	No	V	No	V	No	V	V	V	No	Not available	No
Minnesota	Yes	No	No	V	No	No	No	No	No	V	No	No	No	No
Mississippi	Yes	V	No	Yes	No	No	No	No	No	No	No	Yes	No	No
Missouri	N/A	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A	No
Montana	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Nebraska	Yes	V	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No	No
Nevada	Yes	No	Yes	V	No	No	No	No	Yes	Yes	Yes	V	No	No
New Hampshire	Yes	V	Yes	V	No	V	No	V	Yes	V	Yes	V	No	No
New Jersey	V	V	V	No	V	No	V	No	V	V	V	V	V	No
New Mexico	No	V	No	V	V	V	No	No	V	V	Yes	Yes	No	No
New York	V	V	No	No	No	No	No	No	Yes	No	Yes	No	No	No
North Carolina	Yes	Yes	No	No	No	No	No	Yes	No	Yes	No	No	No	No
North Dakota	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	No
Ohio	Yes	No	No	V	No	No	No	V	No	V	No	V	No	No
Oklahoma	Yes	No	Yes	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No
Oregon	Yes	No	No	Yes	No	No	No	No	No	Yes	No	Yes	No	No
Pennsylvania	Yes	V	V	V	No	No	No	V	Yes	V	Yes	V	No	No
Rhode Island	V	No	V	V	Yes	V	No	No	Yes	V	No	No	No	No
South Carolina	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	No	No
South Dakota	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Tennessee	N/A	Yes	N/A	Yes	N/A	No	N/A	Yes	N/A	Yes	N/A	Yes	N/A	V
Texas	V	No	No	Yes	V	No	V	Yes	Yes	V	Yes	V	No	No
Utah	Yes	Yes	Yes	V	No	V	No	V	Yes	V	No	Yes	Yes	No
Vermont	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	No
Virginia	Yes	V	No	V	No	No	No	V	No	No	No	No	No	No
Washington	No	No	Yes	V	No	V	No	V	No	V	No	V	No	V
West Virginia	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No
Wisconsin	Yes	Yes	No	No	No	No	No	No	No	Yes	No	No	No	No
Wyoming	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Totals														
Yes	**30**	**10**	**19**	**17**	**15**	**9**	**7**	**11**	**28**	**26**	**21**	**25**	**4**	**0**
No	**10**	**28**	**22**	**16**	**24**	**36**	**33**	**30**	**13**	**7**	**21**	**14**	**38**	**49**
V	**7**	**13**	**6**	**18**	**6**	**6**	**5**	**10**	**6**	**18**	**5**	**12**	**4**	**2**
N/A	**4**	**0**	**4**	**0**	**6**	**0**	**6**	**0**	**4**	**0**	**4**	**0**	**4**	**0**
Not available	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

Abbreviations: N/A = information not applicable because treatment is not covered; No = barrier does not apply to any Medicaid enrollee; V = varies, with barrier applying to some, but not all, Medicaid enrollees; Yes = barrier applies to all Medicaid enrollees.

* Data as of December 31, 2008, and December 31, 2018.

† Because of differences in the methods and timing of data collection, some findings differ from findings reported on this topic published before 2014.

§ Barriers apply to one or more cessation treatments.

medications for pregnant women with no cost-sharing[¶¶]; this provision resulted in increases in state Medicaid coverage of cessation counseling and medications for pregnant women (*8*). The second provision, which took effect in January 2014, barred state Medicaid programs that participate in the Medicaid drug rebate program from excluding FDA-approved cessation medications from coverage.[***] This provision likely contributed to the increase observed in this study in the number of states that cover all seven FDA-approved cessation medications (*3*). With the exception of pregnant Medicaid enrollees, the ACA does not require traditional state Medicaid programs to cover cessation counseling or to remove barriers that impede access to cessation counseling and medications.[†††]

Although the progress reported here is encouraging, state Medicaid cessation coverage still falls short of the Healthy People 2020 objective of comprehensive cessation coverage in all 50 states and DC.[§§§] In particular, state Medicaid coverage of counseling lags behind medication coverage, with the number of states that cover both individual and group counseling only increasing from 13 states in 2008 to 16 states in 2018. The combined use of counseling and medication is more effective in increasing quit rates than is the use of either of these treatments alone (*3*). Combined state Medicaid coverage of cessation counseling and medications has been found to be associated with an estimated mean increase in past-year quitting of 3.0 percentage points compared with that in persons without such coverage (*5*).

In addition, as of December 2018, all but two states retained barriers that make it more difficult for Medicaid enrollees to access cessation treatments. Removing these barriers would further increase Medicaid enrollees' access to and use of cessation treatments (*3*,*6*). Although state Medicaid programs made considerable progress in removing copayments during the study period, progress in removing other barriers was mixed.

Summary

What is already known about this topic?

Medicaid enrollees have a higher prevalence of cigarette smoking than do privately insured U.S. residents. Evidence indicates that comprehensive, barrier-free state Medicaid cessation coverage could reduce smoking, smoking-related disease, and health care expenditures among Medicaid enrollees.

What is added by this report?

As of December 31, 2018, 15 states covered all nine evidence-based cessation treatments for all traditional Medicaid enrollees, up from six states at the end of 2008. All but two states retained coverage barriers.

What are the implications for public health practice?

State Medicaid programs can help Medicaid enrollees quit smoking by covering all evidence-based cessation treatments, removing coverage barriers, and promoting treatments to increase their use.

State Medicaid cessation coverage often varies considerably across a state's Medicaid managed care plans in terms of both cessation treatments covered and coverage barriers. Standardizing cessation coverage by having all managed care plans cover all proven cessation treatments with minimal barriers can be beneficial in maximizing Medicaid enrollees' access to proven cessation treatments while minimizing confusion about coverage among enrollees and providers. Standardizing coverage in this way is especially important because states are increasingly moving Medicaid enrollees from fee-for-service coverage into managed care coverage.[¶¶¶]

The findings in this report are subject to at least two limitations. First, when official documents were not publicly available or were outdated or conflicting, state government personnel were contacted for clarification; however, it was not always possible to verify the accuracy of the information they provided. Second, cessation coverage can vary widely across Medicaid managed care plans and can change with little notice, which makes determining these plans' coverage challenging.

Approximately 6.7 million adult smokers report being enrolled in Medicaid, accounting for approximately 20% of adult U.S. cigarette smokers.[****] Whereas smokers enrolled in Medicaid are as likely as are privately insured smokers to want to quit and to make a past-year quit attempt, they are less

[¶] Patient Protection and Affordable Care Act, Pub. L. 111–48 124 Stat. 560, March 23, 2010, as amended through May 1, 2010 (https://www.congress.gov/111/plaws/publ148/PLAW-111publ148.pdf). The Centers for Medicare & Medicaid Services has issued guidance to states on implementing this provision (https://downloads.cms.gov/cmsgov/archived-downloads/SMDL/downloads/SMD11-007.pdf).

[***] Patient Protection and Affordable Care Act, Pub. L. 114–48 124 Stat. 310, March 23, 2010, as amended through May 1, 2010 (https://www.congress.gov/111/plaws/publ148/PLAW-111publ148.pdf). The Centers for Medicare & Medicaid Services has issued guidance to states on implementing this provision (https://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Prescription-Drugs/Downloads/Rx-Releases/State-Releases/state-rel-165.pdf). As of December 31, 2019, the Centers for Medicare & Medicaid Services had published state plan amendments from 38 states declaring that they had implemented this provision. As of December 31, 2018, all 50 states and DC participated in the Drug Rebate program.

[†††] Unlike traditional Medicaid coverage, expanded Medicaid is required to include coverage without cost-sharing of preventive services receiving an A or B rating from the U.S. Preventive Services Task Force (USPSTF). Tobacco cessation intervention has received an A rating from USPSTF. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4265933/.

[§§§] https://www.healthypeople.gov/2020/topics-objectives/topic/tobacco-use/objectives.

[¶¶¶] https://www.kff.org/medicaid/state-indicator/share-of-medicaid-population-covered-under-different-delivery-systems/?currentTimeframe.

[****] This estimate includes enrollees in both traditional and expanded Medicaid, as determined in the 2018 National Health Interview Survey conducted by CDC's National Center for Health Statistics. https://www.cdc.gov/nchs/nhis/data-questionnaires-documentation.htm.

likely to succeed in quitting (*9*,*10*). Compared with smokers with private health insurance, smokers enrolled in Medicaid have been found to be more likely to have chronic diseases and to experience severe psychological distress (*9*). The high smoking prevalence among Medicaid enrollees imposes a substantial health burden on these persons and on society, and is a major driver of federal and state health care expenditures (*3*). Smoking-related diseases accounted for approximately 15% of annual Medicaid spending during 2006–2010, amounting to approximately $39 billion in 2010 (*2*). State Medicaid programs can help reduce this health and financial burden by covering all evidence-based cessation treatments, removing coverage barriers, and promoting covered treatments to Medicaid enrollees and providers to increase their use (*3*–*7*).

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Corresponding author: Stephen Babb, sbabb@cdc.gov, 770-488-1172.

[1]American Lung Association, Chicago, Illinois; [2]Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

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Trends in Incidence of Type 1 and Type 2 Diabetes Among Youths — Selected Counties and Indian Reservations, United States, 2002–2015

Jasmin Divers[1]; Elizabeth J. Mayer-Davis[2]; Jean M. Lawrence[3]; Scott Isom[4]; Dana Dabelea[5]; Lawrence Dolan[6]; Giuseppina Imperatore[7]; Santica Marcovina[8]; David J Pettitt[9]; Catherine Pihoker[10]; Richard F. Hamman[11]; Sharon Saydah[7]; Lynne E. Wagenknecht[12]

Diabetes is one of the most common chronic diseases among persons aged <20 years (*1*). Onset of diabetes in childhood and adolescence is associated with numerous complications, including diabetic kidney disease, retinopathy, and peripheral neuropathy, and has a substantial impact on public health resources (*2*,*3*). From 2002 to 2012, type 1 and type 2 diabetes incidence increased 1.4% and 7.1%, respectively, among U.S. youths (*4*). To assess recent trends in incidence of diabetes in youths (defined for this report as persons aged <20 years), researchers analyzed 2002–2015 data from the SEARCH for Diabetes in Youth Study (SEARCH), a U.S. population-based registry study with clinical sites located in five states. The incidence of both type 1 and type 2 diabetes in U.S. youths continued to rise at constant rates throughout this period. Among all youths, the incidence of type 1 diabetes increased from 19.5 per 100,000 in 2002–2003 to 22.3 in 2014–2015 (annual percent change [APC] = 1.9%). Among persons aged 10–19 years, type 2 diabetes incidence increased from 9.0 per 100,000 in 2002–2003 to 13.8 in 2014–2015 (APC = 4.8%). For both type 1 and type 2 diabetes, the rates of increase were generally higher among racial/ethnic minority populations than those among whites. These findings highlight the need for continued surveillance for diabetes among youths to monitor overall and group-specific trends, identify factors driving these trends, and inform health care planning.

SEARCH is a population-based registry of diabetes with surveillance of 69,457,475 youths (aged <20 years) covering geographically defined populations in Colorado (all 64 counties plus selected Indian reservations in Arizona and New Mexico under the direction of Colorado), Ohio (eight counties), South Carolina (all 46 counties), Washington (five counties), and Kaiser Permanente Southern California (KPSC) health plan enrollees in seven counties (*3*). Although the SEARCH population is similar demographically to the U.S. youth population (*4*), it is not designed to be nationally representative. Case reports were obtained from medical records and validated based on physician diagnosis of diabetes. Eligible participants included nonmilitary and noninstitutionalized persons with diabetes diagnosed at age <20 years, who resided in one of the study counties at the time of diagnosis; for persons in California eligibility required membership in KPSC and for American Indians, participation in Indian Health Services at the time of diagnosis (*3*,*4*). Race and ethnicity were based on self-report (82%), medical records (15%), or geocoding (3%). Diabetes type was noted as the physician-assigned type at 6 months after diagnosis. Incidence rates are reported for all type 1 diabetes in persons aged <20 years. Because the number of type 2 diabetes cases diagnosed in children aged <10 years were too few to report trends in this age group (181 total cases during 2002–2015), incident cases of type 2 diabetes are only included for persons aged 10–19 years at diagnosis.

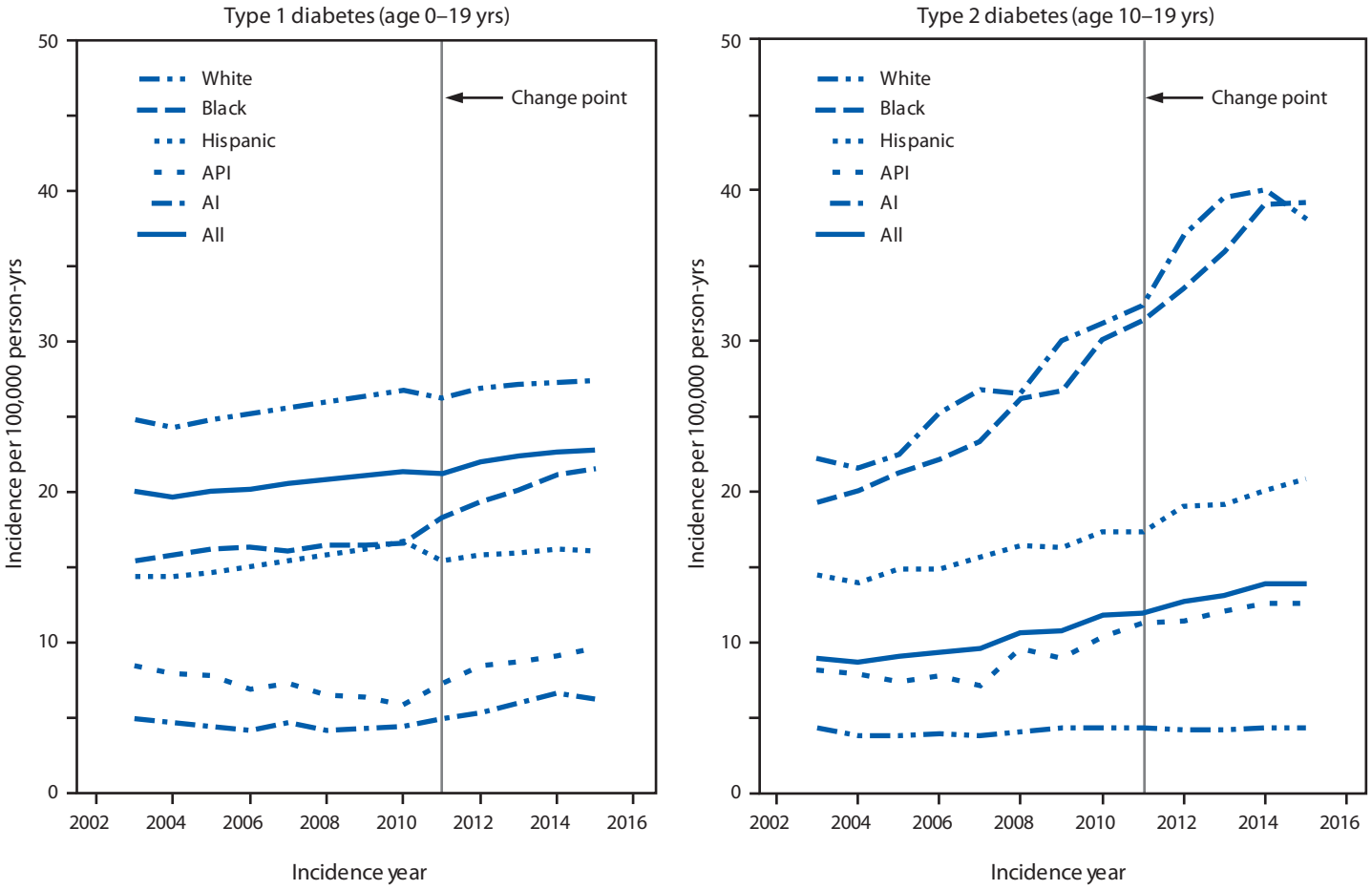
For each incident year, the annual denominators included all civilian residents of the SEARCH sites in the same age ranges on December 31 of that year (*3*,*4*). Incidence rates and 95% confidence intervals (CIs) are presented as 2-year moving averages and expressed per 100,000 person-years (*5*). A change point [or joinpoint] was placed at the year 2011 based on an information criteria measure (*6*). Comparisons were made between the periods 2002–2010 and 2011–2015 to determine whether the annual percentage change (APC) was constant over the 2002–2015 period. Consistency of the incidence trends over time by age, sex, and race/ethnicity was evaluated by testing for interaction between each of these variables separately with the change point at year 2011 using segmented regression. Rates adjusted for age, sex, and race/ethnicity and estimation of the change in the annual incidence trends during 2002–2015 are reported. A statistically significant change in incidence trends is indicated when the 95% CI excluded zero. Incidence trends were modeled separately for type 1 and type 2 diabetes assuming a negative binomial distribution with a logarithmic link and using a generalized autoregressive moving average to account for serial correlation and presented by race/ethnicity (*7*). Completeness of case ascertainment for the four geographically based centers was assessed using capture/recapture, where the number of times an individual case was found, either in hospital or other clinical setting, was used to estimate the number of missed cases (*8*). SAS (version 9.4; SAS Institute) and R (version 3.5.2; The R Foundation) statistical software were used for analyses.

During 2002–2015, among 69,457,475 youths at risk for diabetes, SEARCH identified 14,638 youths with type 1 diabetes and 3,916 with type 2 diabetes. Based on the capture/recapture analysis, few cases were missed, with 98%–99% completeness of ascertainment of cases of type 1 and 92%–97% for type 2 diabetes.

Incidence of type 1 diabetes increased during 2002–2015 in all demographic groups except those who received a diagnosis at age <5 years and American Indians (Figure) (Table 1). Incidence of type 1 diabetes differed by age at diagnosis, sex, and race/ethnicity, with higher rates observed among persons aged 10–14 years, males, and whites. The overall APC adjusted for age, sex, and race/ethnicity in type 1 diabetes incidence was 1.9% per year over the entire period (2002–2015). The APC remained constant for children and adolescents aged 5–19 years, in males, and in females. Steeper increases in age-adjusted and sex adjusted incidence of type 1 diabetes were seen among blacks (2.7% per year), Hispanics (4.0% per year) and Asians and Pacific Islanders (4.4% per year) than among whites (0.7% per year). Incidence among Asians and Pacific Islanders did not change significantly during 2002–2010, then steeply increased during 2011–2015 (8.5% per year).

During 2002–2015, the incidence of type 2 diabetes increased among youths aged 10–19 years in all age, sex, and race/ethnicity groups except whites (Figure) (Table 2). During 2014–2015, type 2 diabetes incidence differed by race/ethnicity, with lowest rates observed among whites (0.77) and higher rates among American Indians (3.69), blacks (5.97), and Hispanics (6.45). In the analyses adjusted for age, sex, race/ethnicity, type 2 diabetes incidence increased at a constant rate from the period 2002–2010 to 2011–2015, with an overall APC of 4.8% per year. The steepest APC increase was among Asians and Pacific Islanders (7.7% per year) followed by Hispanics (6.5% per year), blacks (6.0% per year), and American Indians (3.7% per year).

FIGURE. Model-adjusted incidence of type 1 and type 2 diabetes among youths, overall and by race/ethnicity* — SEARCH for Diabetes in Youth Study (SEARCH), United States,† 2002–2015



Abbreviations: AI = American Indian; API = Asian/Pacific Islander.

* Persons who were AI were primarily from one southwestern tribe.

† SEARCH includes data on youths (<20 years) in Colorado (all 64 counties plus selected Indian reservations in Arizona and New Mexico under the direction of Colorado), Ohio (eight counties), South Carolina (all 46 counties), Washington (five counties), and in California for Kaiser Permanente Southern California health plan enrollees in seven counties.

TABLE 1. Incidence of type 1 diabetes per 100,000 persons per year and annual percent change (APC) in incidence in youths aged <20 years, overall and by age at diagnosis, sex, and race/ethnicity — SEARCH for Diabetes in Youth Study (SEARCH), United States,* 2002–2015

Characteristic	Incidence rate (95% CI)		Adjusted APC§ 2002–2010 (95% CI)	Incidence rate (95% CI)		Adjusted APC† 2011–2015 (95% CI)	Adjusted APC§ 2002–2015 (95% CI)	Change from 2002–2010 to 2011–2015 (95% CI)
	2002–2003	2009–2010		2011–2012	2014–2015			
Overall	**19.5 (18.3 to 20.8)**	**20.4 (19.2 to 21.7)**	**2.0 (0.9 to 3.2)¶**	**21.7 (20.4 to 23.0)**	**22.3 (21.0 to 23.6)**	**1.9 (0.9 to 2.9)¶**	**1.93 (1.34 to 2.51)¶**	**−0.1 (−1.9 to 1.6)**
Age group at diagnosis (yrs)								
0–4	16.5 (14.3 to 19.1)	13.8 (11.9 to 16.0)	0.3 (−2.2 to 3.0)	14.3 (12.4 to 16.6)	14.4 (12.4 to 16.7)	0.8 (−1.4 to 3.0)	0.6 (−0.72 to 1.93)	0.4 (−3.5 to 4.5)
5–9	24.0 (21.3 to 27.0)	27.5 (24.7 to 30.6)	3.3 (1.2 to 5.3)¶	27.7 (25.0 to 30.8)	27.1 (24.4 to 30.1)	0.9 (−0.8 to 2.7)	1.91 (0.86 to 2.98)¶	−2.3 (−5.3 to 0.8)
10–14	26.4 (23.7 to 29.3)	28.7 (25.9 to 31.8)	1.7 (−0.2 to 3.7)	31.8 (28.8 to 35.0)	33.5 (30.5 to 36.8)	3.0 (1.3 to 4.8)¶	2.4 (1.39 to 3.42)¶	1.3 (−1.7 to 4.4)
15–19	11.0 (9.2 to 13.0)	12.0 (10.3 to 14.1)	2.7 (0.1 to 5.4)¶	12.9 (11.1 to 15.0)	13.6 (11.8 to 15.8)	2.3 (0.1 to 4.6)¶	2.44 (1.09 to 3.8)¶	−0.4 (−4.3 to 3.7)
Sex								
Female	19.2 (17.5 to 21.0)	19.7 (18.1 to 21.6)	2.5 (0.8 to 4.2)¶	19.9 (18.3 to 21.8)	20.4 (18.7 to 22.3)	1.0 (−0.4 to 2.4)	1.5 (0.68 to 2.33)¶	−1.4 (−3.9 to 1.1)
Male	19.8 (18.2 to 21.7)	21.0 (19.3 to 22.9)	1.8 (0.2 to 3.4)¶	23.4 (21.6 to 25.3)	24.1 (22.2 to 26.0)	2.6 (1.3 to 4.0)¶	2.33 (1.54 to 3.12)¶	0.8 (−1.6 to 3.3)
Race/Ethnicity								
White	23.9 (22.2 to 25.7)	25.4 (23.7 to 27.4)	1.2 (−0.1 to 2.6)	27.0 (25.2 to 29.0)	27.3 (25.5 to 29.3)	0.5 (−0.7 to 1.7)	0.73 (0.02 to 1.44)¶	−0.8 (−2.9 to 1.4)
Black	14.7 (12.1 to 17.7)	15.5 (12.9 to 18.6)	1.2 (−1.5 to 3.9)	19.0 (16.1 to 22.4)	20.8 (17.7 to 24.4)	4.0 (1.7 to 6.3)¶	2.72 (1.42 to 4.03)¶	2.8 (−1.4 to 7.1)
Hispanic	13.7 (11.4 to 16.4)	16.3 (14.0 to 18.9)	5.9 (3.4 to 8.6)¶	14.8 (12.7 to 17.3)	16.3 (14.1 to 18.8)	2.5 (0.5 to 4.6)¶	4.05 (2.84 to 5.28)¶	−3.2 (−6.7 to 0.4)
Asian/Pacific Islander	7.9 (5.0 to 12.3)	5.5 (3.4 to 8.9)	−1.5 (−7.4 to 4.8)	9.8 (6.8 to 13.9)	9.4 (6.6 to 13.3)	8.5 (3.2 to 14.0)¶	4.36 (1.44 to 7.37)¶	10.1 (0.1 to 21.1)¶
American Indian**	6.6 (3.5 to 12.8)	5.0 (2.3 to 10.7)	−2.0 (−12.2 to 9.5)	6.5 (3.3 to 12.9)	6.2 (3.0 to 12.9)	3.7 (−5.8 to 14.2)	1.17 (−4.05 to 6.68)	5.8 (−11.2 to 26.1)

Abbreviation: CI = confidence interval.

* SEARCH includes data on youths (<20 years) in Colorado (all 64 counties plus selected Indian reservations in Arizona and New Mexico under the direction of Colorado), Ohio (eight counties), South Carolina (all 46 counties), Washington (five counties), and in California for Kaiser Permanente Southern California health plan enrollees in seven counties.

† APC based on model with change point at 2011 and adjusted as follows: overall results adjusted by age, sex, and race/ethnicity; results by age adjusted for sex and race/ethnicity; results by sex adjusted for age and race/ethnicity; results by race/ethnicity adjusted for age and sex.

§ APC based on model without a change point from 2002 to 2015 and adjusted as follows: overall results adjusted by age, sex, and race/ethnicity; results by age adjusted for sex and race/ethnicity; results by sex adjusted for age and race/ethnicity; results by race/ethnicity adjusted for age and sex.

¶ APC and change from 2002–2010 to 2011–2015 significantly different from zero (as indicated by 95% CI that does not include zero).

** Primarily persons from one southwestern tribe.

Discussion

From 2002 to 2015, the annual incidence of both type 1 and type 2 diabetes increased at constant rates among persons aged <20 years in selected counties and Indian reservations in the United States. Rates of increase in incidence were higher for type 2 diabetes (4.8% per year) than for type 1 (1.9%). Since 2012, the rate of increase in type 2 diabetes has not changed, and has also remained constant for type 1 diabetes, except among Asians and Pacific Islanders. These findings provide indicators of the number of new cases of type 1 and type 2 diabetes among U.S. youths and identify groups with increased incidences of both type 1 and type 2 diabetes. Diabetes is a chronic disease that requires lifelong treatment and management. Better understanding of the number of new cases of diabetes among youths helps in planning for health care needs and resources.

The findings in this report are subject to at least two limitations. First, a small number of cases was ascertained across years, in subgroups by diabetes type, and especially across racial/ethnic groups, possibly leading to less precision in the annual rates. Second, these findings might not be generalizable to other populations because SEARCH was not designed to be nationally representative; it includes populations from five U.S. sites. A major strength of this study is that data come from a complete, population-based registry covering approximately a decade, including both type 1 and type 2 diabetes in persons aged <20 years across multiple racial/ethnic groups.

The incidence of type 1 diabetes continues to increase in U.S. youths, with steeper increases observed in black and Hispanic youths. Since 2011, the incidence of type 1 diabetes has also significantly increased among Asians and Pacific Islanders. Reasons for this recent increase are unknown. In parallel with increased obesity prevalence in U.S. youths (*9*), the incidence

Summary

What is already known about this topic?

Diabetes, one of the most common chronic diseases among youths, is associated with numerous complications, and has a substantial impact on public health resources. From 2002 to 2012, type 1 and type 2 diabetes incidence has increased among U.S. youths aged <20 years.

What is added by this report?

From 2011 to 2015, both type 1 and type 2 diabetes incidence continued to increase among youths at five U.S. sites included in the SEARCH for Diabetes in Youth Study, especially among racial and ethnic minority populations.

What are the implications for public health practice?

Ongoing surveillance to monitor trends in type 1 and type 2 diabetes incidence can help identify population subgroups at increased risk for diabetes to aid prevention efforts and planning for future health care needs

TABLE 2. Incidence of type 2 diabetes per 100,000 persons per year and annual percent change (APC) in incidence in youths aged 10–19 years, overall and by age at diagnosis, sex and race/ethnicity — SEARCH for Diabetes in Youth Study (SEARCH), United States,* 2002 to 2015

Characteristic	Incidence rate (95% CI) 2002–2003	Incidence rate (95% CI) 2009–2010	Adjusted APC† 2002–2010 (95% CI)	Incidence rate (95% CI) 2011–2012	Incidence rate (95% CI) 2014–2015	Adjusted APC† 2011–2015 (95% CI)	Adjusted APC† 2002–2015 (95% CI)	Change from 2002–2010 to 2011–2015 (95% CI)
Overall	**9.0 (7.9 to 10.2)**	**12.2 (10.9 to 13.6)**	**5.1 (2.9 to 7.4)¶**	**12.5 (11.2 to 13.9)**	**13.8 (12.4 to 15.3)**	**4.6 (2.7 to 6.4)¶**	**4.81 (3.7 to 5.92)¶**	**−0.6 (−3.8 to 2.7)**
Age group at diagnosis (yrs)								
10–14	8.0 (6.6 to 9.7)	12.0 (10.2 to 14.0)	5.2 (1.9 to 8.5)¶	12.1 (10.3 to 14.1)	12.4 (10.6 to 14.5)	3.9 (1.3 to 6.6)¶	4.57 (2.95 to 6.22)¶	−1.2 (−5.8 to 3.6)
15–19	10.0 (8.4 to 11.9)	12.4 (10.7 to 14.5)	5.0 (2.0 to 8.2)¶	12.9 (11.1 to 15.0)	15.2 (13.2 to 17.5)	5.1 (2.6 to 7.7)¶	5.02 (3.48 to 6.58)¶	0.1 (−4.3 to 4.7)
Sex								
Female	11.1 (9.4 to 13.1)	15.8 (13.8 to 18.2)	6.6 (3.7 to 9.7)¶	16.1 (14.1 to 18.5)	16.7 (14.6 to 19.1)	3.9 (1.6 to 6.4)¶	5.11 (3.6 to 6.64)¶	−2.5 (−6.5 to 1.7)
Male	7.0 (5.7 to 8.6)	8.7 (7.2 to 10.4)	3.1 (−0.3 to 6.5)	9.0 (7.5 to 10.7)	11.1 (9.4 to 13.0)	5.4 (2.6 to 8.3)¶	4.41 (2.69 to 6.15)¶	2.3 (−2.6 to 7.5)
Race/Ethnicity								
White	4.4 (3.4 to 5.5)	4.8 (3.8 to 6.1)	1.9 (−2.3 to 6.3)	3.9 (3.0 to 5.0)	4.5 (3.5 to 5.7)	−0.1 (−3.7 to 3.5)	0.77 (−1.35 to 2.94)	−2.0 (−8.2 to 4.6)
Black	20.0 (16.0 to 25.1)	31.0 (25.8 to 37.2)	6.3 (2.6 to 10.1)¶	32.5 (27.2 to 38.9)	37.8 (31.9 to 44.7)	5.8 (2.8 to 8.8)¶	5.97 (4.14 to 7.85)¶	−0.5 (−5.6 to 5.0)
Hispanic	13.3 (10.2 to 17.4)	17.2 (14.0 to 21.2)	6.3 (2.2 to 10.5)¶	18.4 (15.2 to 22.4)	20.9 (17.4 to 24.9)	6.6 (3.4 to 9.9)¶	6.45 (4.44 to 8.49)¶	0.3 (−5.4 to 6.3)
Asian/Pacific Islander	11.0 (6.5 to 18.7)	12.9 (8.3 to 20.1)	7.9 (−0.8 to 17.4)	12.2 (7.8 to 19.0)	11.9 (7.8 to 18.3)	7.6 (1.0 to 14.6)¶	7.72 (3.44 to 12.19)¶	−0.3 (−11.8 to 12.7)
American Indian**	22.6 (13.9 to 36.8)	30.1 (19.4 to 46.5)	5.1 (−2.1 to 12.8)	45.0 (31.1 to 65.1)	32.8 (20.8 to 51.6)	2.6 (−3.2 to 8.8)	3.69 (0.11 to 7.39)¶	−2.3 (−12.3 to 8.7)

Abbreviation: CI = confidence interval.

* SEARCH includes data on youths (<20 years) in Colorado (all 64 counties plus selected Indian reservations in Arizona and New Mexico under the direction of Colorado), Ohio (eight counties), South Carolina (all 46 counties), Washington (five counties), and in California for Kaiser Permanente Southern California health plan enrollees in seven counties.

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§ APC based on model without a change point from 2002–2015 and adjusted as follows: overall results adjusted by age, sex, race/ethnicity; results by age adjusted for sex and race/ethnicity; results by sex adjusted for age and race/ethnicity; results by race/ethnicity adjusted for age and sex.

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** Primarily persons from one southwestern tribe.

of type 2 diabetes among adolescents has increased at a higher rate than that of type 1 diabetes, especially among racial/ethnic minority youths. There are no known prevention interventions for type 1 diabetes; in adults the onset of type 2 diabetes can be prevented or delayed with lifestyle changes programs, such as the National Diabetes Prevention Program (https://www.cdc.gov/diabetes/prevention/index.html). Although the effectiveness of these programs among youths is unknown, promoting healthy eating and lifestyles provides many health benefits (https://www.cdc.gov/diabetes/prevent-type-2/type-2-kids.html). One program targeting the prevention of type 2 diabetes in American Indian youths is the Native Diabetes Wellness Program (https://www.cdc.gov/diabetes/ndwp/index.html). This collaboration between CDC and other partners provides resources to promote healthy eating and physical activity in American Indian and Alaska Native youths. To assess public health needs and prevention efforts for type 1 and type 2 diabetes among youths, it is important to enhance and continue surveillance efforts to monitor incidence in this population.

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Corresponding author: Jasmin Divers, jasmin.divers@nyulangone.org, 516-663-4966.

[1]Division of Health Services Research, Department of Foundations of Medicine, New York University Long Island School of Medicine, Mineola, New York; [2]Departments of Nutrition and Medicine, University of North Carolina, Chapel Hill, North Carolina; [3]Department of Research & Evaluation, Kaiser Permanente Southern California, Pasadena, California; [4]Department of Biostatistics and Data Science, Wake Forest School of Medicine, Winston-Salem, North Carolina; [5]Department of Epidemiology, Colorado School of Public Health, Aurora, Colorado; [6]Department of Endocrinology, Children's Hospital Medical Center, Cincinnati, Ohio; [7]Division of Diabetes Translation, National Center for Chronic Disease Prevention and Health Promotion, CDC; [8]Northwest Lipid Research Laboratory, Seattle Washington; [9]Kaiser Permanente Southern California, Pasadena, California; Santa Barbara, California; [10]Department of Pediatrics, University of Washington, Seattle, Washington; [11]Department of Epidemiology, Colorado School of Public Health, University of Colorado Denver, Aurora, Colorado; [12]Division of Public Health Sciences, Wake Forest School of Medicine, Winston-Salem, North Carolina.

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Persons Evaluated for 2019 Novel Coronavirus — United States, January 2020

Kristina L. Bajema, MD[1,2]; Alexandra M. Oster, MD[3]; Olivia L. McGovern, PhD[1,2]; Stephen Lindstrom, PhD[4]; Mark R. Stenger, MA[5]; Tara C. Anderson, DVM, PhD[6]; Cheryl Isenhour, DVM[2]; Kevin R. Clarke, MD[7]; Mary E. Evans, MD[8]; Victoria T. Chu, MD[1,4]; Holly M. Biggs, MD[4]; Hannah L. Kirking, MD[4]; Susan I. Gerber, MD[4]; Aron J. Hall, DVM[4]; Alicia M. Fry, MD[9]; Sara E. Oliver, MD[2]; 2019-nCoV Persons Under Investigation Team

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In December 2019, a cluster of cases of pneumonia emerged in Wuhan City in central China's Hubei Province. Genetic sequencing of isolates obtained from patients with pneumonia identified a novel coronavirus (2019-nCoV) as the etiology (*1*). As of February 4, 2020, approximately 20,000 confirmed cases had been identified in China and an additional 159 confirmed cases in 23 other countries, including 11 in the United States (*2*,*3*). On January 17, CDC and the U.S. Department of Homeland Security's Customs and Border Protection began health screenings at U.S. airports to identify ill travelers returning from Wuhan City (*4*). CDC activated its Emergency Operations Center on January 21 and formalized a process for inquiries regarding persons suspected of having 2019-nCoV infection (*2*). As of January 31, 2020, CDC had responded to clinical inquiries from public health officials and health care providers to assist in evaluating approximately 650 persons thought to be at risk for 2019-nCoV infection. Guided by CDC criteria for the evaluation of persons under investigation (PUIs) (*5*), 210 symptomatic persons were tested for 2019-nCoV; among these persons, 148 (70%) had travel-related risk only, 42 (20%) had close contact with an ill laboratory-confirmed 2019-nCoV patient or PUI, and 18 (9%) had both travel- and contact-related risks. Eleven of these persons had laboratory-confirmed 2019-nCoV infection. Recognizing persons at risk for 2019-nCoV is critical to identifying cases and preventing further transmission. Health care providers should remain vigilant and adhere to recommended infection prevention and control practices when evaluating patients for possible 2019-nCoV infection (*6*). Providers should consult with their local and state health departments when assessing not only ill travelers from 2019-nCoV-affected countries but also ill persons who have been in close contact with patients with laboratory-confirmed 2019-nCoV infection in the United States.

As part of CDC's Emergency Operations Center activation, CDC personnel assist state and local health departments with the evaluation of 2019-nCoV PUIs. Public health laboratories were not yet conducting 2019-nCoV testing during the period covered by this report, while awaiting Food and Drug Administration emergency use authorization for the test. (The authorization occurred on February 4*). Therefore, all testing was conducted at CDC. A call center was staffed by a team of physicians and nurses 24 hours per day. During January 17–31, criteria used to determine whether a person was considered to be a PUI included presence of fever and symptoms of lower respiratory tract illness (e.g., cough or difficulty breathing) in addition to epidemiologic risk. Epidemiologic risk factors included history of travel from Wuhan City, close contact with a patient with laboratory-confirmed 2019-nCoV infection, or close contact with an ill PUI. Given the evolving understanding of 2019-nCoV epidemiology, testing was recommended for some persons who did not strictly meet the PUI definition, based on clinical discretion. For clinical inquiries that resulted in 2019-nCoV testing, real-time reverse transcription polymerase chain reaction testing was conducted at CDC using methods developed specifically to detect 2019-nCoV (*7*).

For this report, CDC reviewed inquiries regarding potential 2019-nCoV PUIs received by CDC through January 31, 2020, from state and local health departments, health care providers, and airport health screening personnel. Information was compiled from call logs and PUI forms to assess source of inquiry, PUI demographic data (including age and sex), clinical information, epidemiologic risk factors, and 2019-nCoV test results. To allow for delays in specimen shipping and testing, data for PUIs for whom an initial inquiry was received during January 2020 were collected through February 4, 2020.

During January 2020, approximately 30 CDC physicians and nurses responded to inquiries regarding approximately 650 persons. Testing was recommended for 256 persons (Figure) across 34 jurisdictions (the jurisdictions included states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands) and was completed for 210 persons. Testing of PUIs was not always performed because alternative diagnoses were made, or symptoms resolved. Among inquiries resulting in testing, six (3%) persons were identified through airport screening, 178 (85%) in a health care setting, and 26 (12%) through contact tracing (Table). Among 178 persons identified in a health care setting, the type of setting was reported for 125 (70%), including 79 (63%) who were evaluated at an emergency department or hospital, 22 (18%) at a student clinic, and 24 (19%) in other outpatient care settings. A total of 115 (55%) persons tested were male, and median age was 29 years (interquartile range = 21–49 years). Seventeen (8%)

* https://www.fda.gov/news-events/press-announcements/fda-takes-significant-step-coronavirus-response-efforts-issues-emergency-use-authorization-first.

were health care workers, and 48 of 129 persons with available information were reported to be college students.

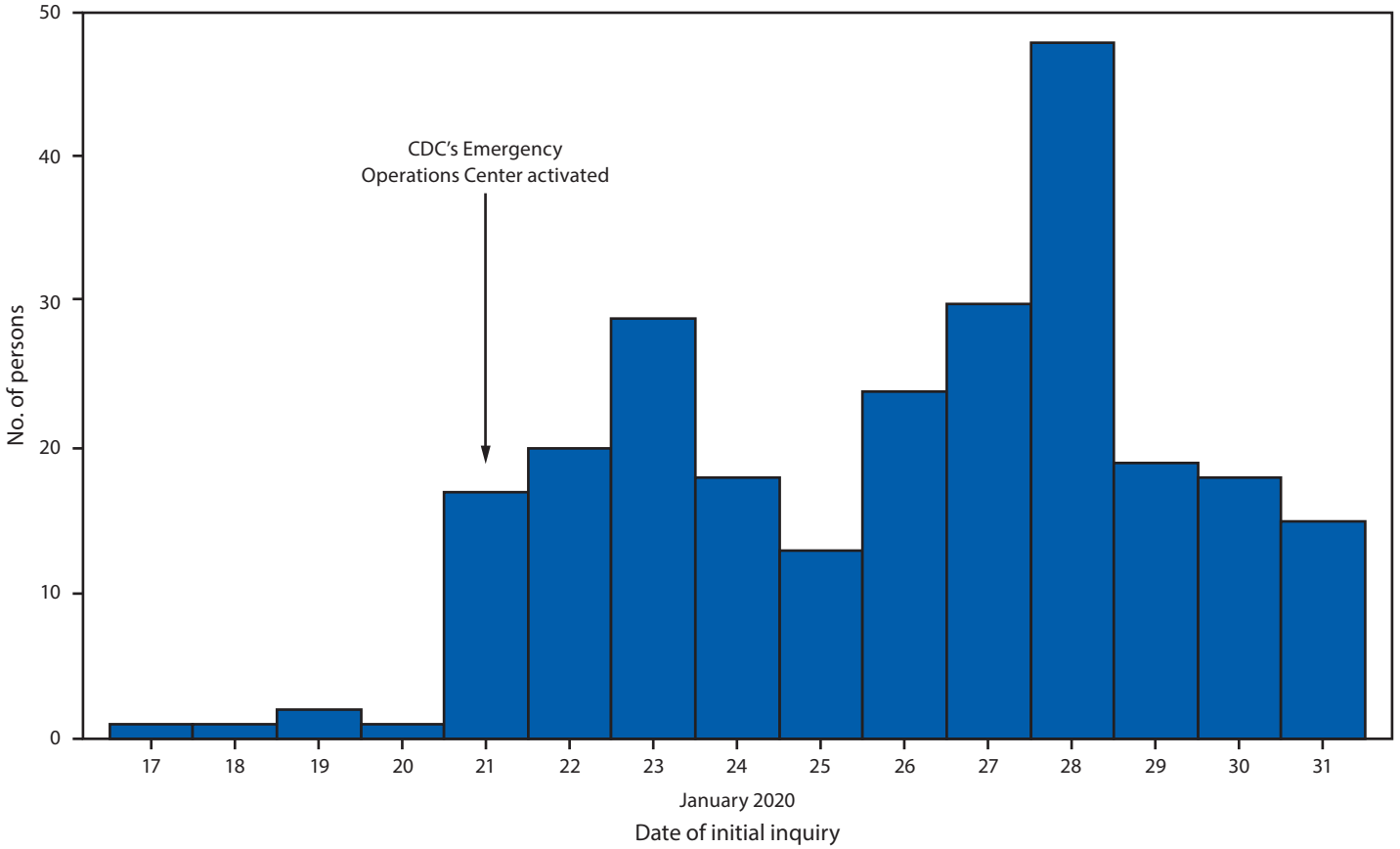
All 210 persons who were tested were symptomatic: 143 (68%) had subjective fever or a measured temperature ≥100.4°F (≥38°C), and 189 (90%) had cough or shortness of breath. Upper respiratory tract symptoms (i.e., sore throat, rhinorrhea, or congestion) were common and were present in nine persons who did not have cough or shortness of breath. Thirty persons were reported to test positive for another respiratory viral pathogen, including influenza or respiratory syncytial virus. Forty-two (20%) patients were hospitalized, and four (2%) were admitted to an intensive care unit. One patient was deceased at the time of notification; testing for this person was negative, and an alternative cause of death was established. Travel-related risk was identified for 148 (70%) persons, 42 (20%) had close contact with ill patients with laboratory-confirmed 2019-nCoV infection or PUIs, 18 (9%) had both travel- and contact-related risks, and two (<1%) had possible contact with a laboratory-confirmed 2019-nCoV patient and were therefore tested.

Among the 210 persons tested, 11 (5%) were found to have 2019-nCoV infection. Nine of these persons had traveled to Wuhan City; two persons had not traveled but had been in close contact with patients with laboratory-confirmed 2019-nCoV in the United States. All were symptomatic with fever (subjective or measured) or cough.

Discussion

Quickly identifying persons at risk for 2019-nCoV is critical to slowing the potential spread of 2019-nCoV in the United States. This report describes CDC's current approach to facilitating recommended diagnostic testing of persons who might have 2019-nCoV infection. In response to the emergence of 2019-nCoV in China during a time of rapidly evolving understanding of the epidemiology and clinical presentation of 2019-nCoV infection, CDC has provided consultation regarding

FIGURE. Number of persons for whom 2019 novel coronavirus (2019-nCoV) testing was recommended, by date of initial inquiry (N = 256) — United States, January 2020*,†



* Confirmed cases were reported as of January 31, 2020.
† Public announcements of a confirmed 2019-nCoV case in the United States were made on the following dates: Jan 21, Jan 24, Jan 26, Jan 27 (two cases), Jan 30, and Jan 31.

TABLE. Clinical characteristics and epidemiologic risk factors among persons tested for 2019 novel coronavirus (2019-nCoV) infection (N = 210) — United States, January 2020

Characteristic	Completed 2019-nCoV testing No.* (%)
Demographics	
Age group (yrs), median (IQR)	29 (21–49)
<5	10 (5)
5–17	8 (4)
18–49	138 (66)
50–64	46 (22)
≥65	4 (2)
Male sex	115 (55)
Clinical features	
Signs or symptoms	
Subjective fever or measured temperature ≥100.4°F (≥38.0°C)	143 (68)
Cough or shortness of breath	189 (90)
Clinical Course	
Hospitalized	42 (20)
Admitted to ICU	4 (2)
Died†	1 (<1)
Setting where patient identified	
Airport screening	6 (3)
Health care setting	178 (85)
Contact tracing§	26 (12)
Epidemiologic risk category	
Travel from China¶	148 (70)
Close contact with an ill laboratory-confirmed 2019-nCoV patient or a PUI in the United States**	42 (20)
Travel from China and close contact identified††	18 (9)
Other risk§§	2 (<1)

Abbreviations: ICU = intensive care unit; IQR = interquartile range; PUI = person under investigation.

* Numbers might not sum to total because of missing data.

† For this person, testing was negative for 2019-nCoV, and an alternative cause of death was established.

§ Additional persons who were being followed through contact tracing but initially sought treatment at a health care setting are not included in this category.

¶ Includes 113 persons who traveled from Wuhan City and 35 who traveled from areas of China outside Wuhan within 14 days of symptom onset.

** Includes 33 persons who were close contacts of an ill laboratory-confirmed 2019-nCoV patient and nine who were close contacts of PUIs. All contacts occurred within 14 days of symptom onset.

†† Includes four persons who traveled from Wuhan City and were close contacts of an ill laboratory-confirmed 2019-nCoV patient, 11 who traveled from Wuhan City and were close contacts of PUIs, and three who traveled from China and were close contacts of a PUI.

§§ Had possible contact with a laboratory-confirmed 2019-nCoV patient and were therefore tested.

persons suspected of being at risk for 2019-nCoV to public health officials and health care providers throughout the United States.

Epidemiologic risk factors among the 210 persons tested for 2019-nCoV were not limited to travel: 20% of PUIs tested had not recently traveled to China but reported close contact with a person being evaluated for 2019-nCoV infection. Because person-to-person transmission is expected to continue, and as further travel restrictions are implemented, it is likely that the proportion of PUIs with such contact risk in the United States will increase among all persons evaluated for 2019-nCoV.

CDC mobilized early in the response and state and local health departments similarly increased capacity to provide clinical consultation regarding 2019-nCoV. The collection of clinical and epidemiologic data that described characteristics of persons tested for 2019-nCoV helped to inform changes to criteria for PUI evaluation.

On January 31, 2020, CDC published updated PUI guidance (*8*) in response to the evolving global epidemiology of 2019-nCoV, including the rapid geographic expansion and documentation of person-to-person transmission (*9*). Updated guidance emphasizes 2019-nCoV testing for symptomatic persons in close contact with patients with laboratory-confirmed 2019-nCoV infection, persons returning from Hubei province in addition to Wuhan City, and persons from mainland China requiring hospitalization because of fever and lower respiratory tract illness. Additional refinements to this approach likely will be needed in the future as understanding of 2019-nCoV epidemiology continues to improve.

The findings in this report are subject to at least three limitations. First, the number of clinical inquiries received by CDC does not represent all inquiries received by health departments. Second, because the primary objective of this effort was to guide a timely public health response, some clinical and epidemiologic risk factor data might be incomplete. Finally, given the limited available epidemiologic information early in the outbreak, to provide some latitude for clinical decision-making regarding diagnostic testing, the PUI definition was not strictly applied in all cases.

A coordinated national effort to diagnose 2019-nCoV among persons at high risk for infection is important to facilitate appropriate management and limit transmission in the United States. CDC's website provides guidance for health care professionals on evaluating persons for 2019-nCoV (*10*). Clinicians should maintain a high index of suspicion for possible 2019-nCoV illness not only among persons with fever and lower respiratory tract illness who report travel from China in the past 14 days but also symptomatic persons who have had close contact with patients with laboratory-confirmed 2019-nCoV infection. Clinicians should consult their local and state health departments when they suspect possible 2019-nCoV illness to facilitate diagnosis and aid prevention efforts.

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Corresponding author: Kristina L. Bajema, kbajema@cdc.gov, 404-639-1204.

Summary

What is already known about this topic?

During a 2020 outbreak of novel coronavirus (2019-nCoV) infection, CDC provided consultation to public health officials and health care providers evaluating persons at risk for 2019-nCoV infection.

What is added by this report?

During January 2020, CDC responded to clinical inquiries regarding approximately 650 persons in the United States and tested 210 for 2019-nCoV, one fifth of whom reported no recent travel-related risk but had close contact with a 2019-nCoV patient or a person under investigation for 2019-nCoV in the United States.

What are the implications for public health practice?

Health care providers should remain vigilant regarding possible 2019-nCoV exposure not only among returning travelers, but also among persons in close contact with 2019-nCoV patients in the United States.

[1]Epidemic Intelligence Service, CDC; [2]Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC; [3]Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; [4]Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; [5]Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; [6]Division of Health Informatics and Surveillance, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; [7]Division of Global Health Protection, Center for Global Health, CDC; [8]Division of Overdose Prevention, National Center for Injury Prevention and Control, CDC; [9]Influenza Division, National Center for Immunization and Respiratory Diseases, CDC.

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

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2019-CoV Persons Under Investigation Team

Glen Abedi, National Center for Immunization and Respiratory Diseases, CDC; William Bower, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Kevin Chatham-Stephens, National Center on Birth Defects and Developmental Disabilities, CDC; Laura Conklin, Center for Global Health, CDC; Laura Cooley, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Margaret Cortese, National Center for Immunization and Respiratory Diseases, CDC; Aaron Curns, National Center for Immunization and Respiratory Diseases, CDC; Kathleen Dooling, National Center for Immunization and Respiratory Diseases, CDC; Runa Gokhale, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Jeremy Gold, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Gavin Grant, Center for Global Health, CDC; Julie Gutman, Center for Global Health, CDC; Elisabeth Hesse, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Shifaq Kamili, National Center for Immunization and Respiratory Diseases, CDC; Lindsay Kim, National Center for Immunization and Respiratory Diseases, CDC; Robert Kirkcaldy, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Emily Koumans, National Center for Chronic Disease Prevention and Health Promotion, CDC; Stephanie Kujawski, National Center for Immunization and Respiratory Diseases, CDC; Gayle Langley, National Center for Immunization and Respiratory Diseases, CDC; Joana Lively, National Center for Immunization and Respiratory Diseases, CDC; Xiaoyan Lu, National Center for Immunization and Respiratory Diseases, CDC; Brian Lynch, National Center for Immunization and Respiratory Diseases, CDC; Sheryl Lyss, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Lakshmi Malapati, National Center for Immunization and Respiratory Diseases, CDC; Michael Martin, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Sarah Mbaeyi, National Center for Immunization and Respiratory Diseases, CDC; Paul McClung, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Claire Midgley, National Center for Immunization and Respiratory Diseases, CDC; Maureen Miller, National Center for Chronic Disease Prevention and Health Promotion, CDC; Michelle Morales, Center for Global Health, CDC; Janna' Murray, National Center for Immunization and Respiratory Diseases, CDC; Amy Parker Fiebelkorn, National Center for Immunization and Respiratory Diseases, CDC; Manisha Patel, National Center for Immunization and Respiratory Diseases, CDC; Georgina Peacock, National Center for Birth Defects and Developmental Disabilities, CDC; Taran Pierce, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Brian Rha, National Center for Immunization and Respiratory Diseases, CDC; Senthilkumar Sakthivel, National Center for Immunization and Respiratory Diseases, CDC; Eileen Schneider, National Center for Immunization and Respiratory Diseases, CDC; David A. Siegel, National Center for Chronic Disease Prevention and Health Promotion, CDC; Brittany Sunshine, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Megan Wallace, National Center for Immunization and Respiratory Diseases, CDC; Lijuan Wang, National Center for Immunization and Respiratory Diseases, CDC; John Watson, National Center for Immunization and Respiratory Diseases, CDC; Brett Whitaker, National Center for Immunization and Respiratory Diseases, CDC; Anna Yousaf, National Center for Immunization and Respiratory Diseases, CDC.

Notes from the Field

Carbapenem-resistant *Klebsiella pneumoniae* with *mcr-1* Gene Identified in a Hospitalized Patient — Wyoming, January 2019

Heather Rhodes, MPH[1,2]; Cody Loveland, MPH[2]; Clayton Van Houten, MS[2]; Noah Hull, PhD[2,3]; Alexia Harrist, MD, PhD[2]

In mid-December 2018, an adult with a history of recurrent urinary tract infections was admitted to a Wyoming hospital with acute confusion. Because of a history of methicillin-resistant *Staphylococcus aureus*, the patient was placed on contact precautions in a private room. Admission urine culture and antimicrobial susceptibility testing identified carbapenem-resistant *Klebsiella pneumoniae* with extended-spectrum beta-lactamase production. Susceptibility to colistin, an antibiotic of last resort, was not tested. Carbapenem-resistant *Enterobacteriaceae* (CRE) infections are reportable to the Wyoming Department of Health (WDH), and the isolate was sent to the Wyoming Public Health Laboratory (WPHL), where ertapenem resistance was confirmed. Further testing identified resistance to 16 antibiotics* and susceptibility to amikacin, imipenem, meropenem, and tigecycline. Using the Carba NP assay (*1*), carbapenemase production was not found. WPHL sent the isolate to the Texas Antibiotic Resistance (AR) Laboratory Network regional laboratory for further characterization. Because of known sensitivity issues with the Carba NP assay (*2*), repeat testing used the modified carbapenem inactivation method. Texas AR Laboratory Network confirmed WPHL results. Colistin susceptibility testing by broth microdilution found that the minimum inhibitory concentration was >4 μg/mL, which was above the Clinical and Laboratory Standards Institute's epidemiologic cutoff value for wild type *Enterobacteriaceae* (≤2 μg/mL) (*3*). The plasmid-mediated *mcr-1* colistin resistance gene was detected using a CDC-developed multiplex real-time polymerase chain reaction assay (*4*). In early January 2019, Texas AR Laboratory Network alerted WDH that the isolate carried the *mcr-1* gene.

WDH began an investigation using CDC guidance† to determine where the patient might have acquired the microorganism and to identify any spread to other hospitalized patients. WDH reviewed medical records and interviewed the patient and family members. The patient reported U.S. travel, but no international travel or livestock exposure. The patient had experienced repeated urinary tract infections with carbapenem-susceptible *Escherichia coli* and *K. pneumoniae* during the previous 2 years, which were treated with cephalosporin, fluoroquinolone, and nitrofuran antibiotics. The patient's last hospitalization in Wyoming, for *E. coli* bacteremia, occurred 17 months earlier. In August 2018, the patient underwent a cystoscopy at a hospital-affiliated Colorado outpatient urology clinic. The Colorado Department of Public Health and Environment conducted a separate retrospective investigation into CRE reports from the clinic's geographic region; no evidence of ongoing CRE transmission was identified. The patient recovered after receiving appropriate antibiotics and was discharged in January 2019.

WDH reviewed the Wyoming hospital's infection control measures. Medical, nursing, and infection control staff members reported adherence to contact precautions throughout the patient's stay. A point-prevalence survey was conducted to identify possible transmission. Six patients whose hospitalizations overlapped with the index patient's by >1 day on the same hospital unit were identified. Rectal swabs were collected from four consenting patients and sent to CDC's Antimicrobial Resistance and Characterization Laboratory to test for *mcr-1*–positive CRE colonization. All were negative.

The presence of *mcr-1* in CRE could promote development of untreatable, panresistant infections.§ Multiple countries have reported the *mcr-1* gene in *Enterobacteriaceae* species isolated from food, water, humans, and the environment (*5*), including two animal isolates and 55 human isolates in the United States.¶ Bacteria harboring *mcr-1* have been acquired in community and health care settings (*6*). Although *mcr-1* is less common in *K. pneumoniae* than other *Enterobacteriaceae*, presence of this transferable resistance gene in this species is of public health concern because it likely carries other antimicrobial mechanisms for resistance and is frequently associated with health care settings.**

First identified in the United States in Pennsylvania in 2016 and since then reported in 20 more states, this is the first *mcr-1* isolate reported in Wyoming or surrounding states. The patient's frequent intermittent antibiotic use could have increased the risk for contracting antibiotic-resistant bacteria,

* Resistant: trimethoprim/sulfamethoxazole, tobramycin, piperacillin/tazobactam, nitrofurantoin, levofloxacin, gentamicin, ertapenem, ciprofloxacin, ceftriaxone, ceftazidime, cefotaxime, cefepime, cefazolin, aztreonam, ampicillin/sulbactam, and ampicillin; no Clinical and Laboratory Standards Institute breakpoint: polymyxin B.

† https://www.cdc.gov/hai/containment/guidelines.html.

§ https://www.cdc.gov/drugresistance/solutions-initiative/stories/gene-reported-mcr.html.

¶ https://www.cdc.gov/drugresistance/biggest-threats/tracking/mcr.html.

** https://www.cdc.gov/hai/organisms/organisms.html#Klebsiella.

but the route of acquisition is unknown. Wyoming's CRE surveillance protocols supported identification of *mcr-1*. In general, laboratory testing of colistin-resistant CRE for the presence of *mcr* genes should be considered.

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Sarah Janelle; Kyle Schutz; Alicia Shugart; Maroya Walters; Stacey Bosch; CDC Antimicrobial Resistance and Characterization Laboratory.

Corresponding author: Heather Rhodes, olz5@cdc.gov, 307-777-5532.

[1]Epidemic Intelligence Service, CDC; [2]Public Health Division, Wyoming Department of Health; [3]Wyoming Public Health Laboratory.

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Erratum: Vol. 69, No. 5

In the report "Initial Public Health Response and Interim Clinical Guidance for the 2019 Novel Coronavirus Outbreak — United States, December 31, 2019–February 4, 2020," on page 142, the fourth sentence of the first paragraph under "Laboratory and Diagnostic Support" should have read "On **February** 4, 2020 the Food and Drug Administration issued an Emergency Use Authorization to enable emergency use of CDC's 2019-nCoV Real-Time RT-PCR Diagnostic Panel."

On page 142, the first sentence of the first paragraph in the second column should have read "CDC is working closely with FDA and public health partners, including the **Association of** Public Health Laboratories, to rapidly share these tests domestically and internationally through CDC's International Reagent Resource (https://www.internationalreagentresource.org/)."

In addition, names of the members of the 2019-nCoV CDC Response Team were omitted. The names are included below.

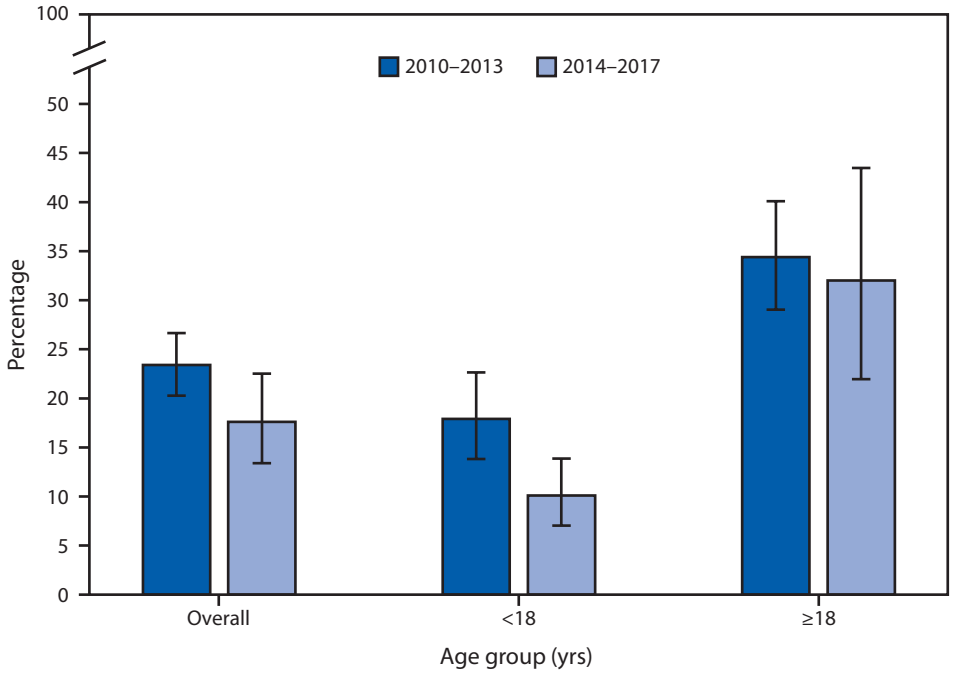
2019-nCoV CDC Response Team

Faruque Ahmed, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Olivia Almendares, National Center for Immunization and Respiratory Diseases, CDC; Ashwin Belludi, National Center for Immunization and Respiratory Diseases, CDC; Isaac Benowitz, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Chris Braden, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Christina Carlson, Center for Global Health, CDC; Howard Chiou, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; Nakia Clemmons, National Center for Immunization and Respiratory Diseases, CDC; Dave Daigle, Center for Global Health, CDC; Meghna Desai, Center for Global Health, CDC; Lindsey Duca, National Center for Chronic Disease Prevention and Health Promotion, CDC; Marc Fischer, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Isaac Ghinai, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; Carolyn Greene, National Center for Immunization and Respiratory Diseases, CDC; Cheri Grigg, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Ardath Grills, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Katherina Grusich, National Center for Immunization and Respiratory Diseases, CDC; Benjamin Hallowell, National Center for Immunization and Respiratory Diseases, CDC; Connor Hoff, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Jesica Jacobs, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; Bradley King, National Institute for Occupational Safety and Health, CDC; John MacArthur, Center for Global Health, CDC; Claire Mattison, National Center for Immunization and Respiratory Diseases, CDC; Jason McDonald, Center for Preparedness and Response, CDC; Tristan McPherson, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; Alexander Millman, National Center for Immunization and Respiratory Diseases, CDC; Shannon Novosad, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Mary Pomeroy, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Noreen Qualls, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Maryan Reynolds, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Heather Rhodes, Center for Surveillance, Epidemiology, and Laboratory Services, CDC; Rajeev Sharma, Center for Global Health, CDC; Robert Simmonds, Center for Global Health, CDC; Rebekah Stewart, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; Rebecca Sunenshine, Center for Preparedness and Response, CDC; Mark Tenforde, National Center for Immunization and Respiratory Diseases, CDC; Amra Uzicanin, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Jennifer Verani, Center for Global Health, CDC; Florence Whitehill, National Center on Birth Defects and Developmental Disabilities, CDC; Kathryn Wilson, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Jonathan Wortham, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Emergency Department Visits for Acute Viral Upper Respiratory Tract Infection† at Which an Antimicrobial Was Given or Prescribed,§ by Age — United States, 2010–2017¶



* With 95% confidence intervals indicated with error bars.
† Acute viral upper respiratory tract infection defined as a visit with only one listed diagnosis including the following codes, that are generally viral in etiology, from the *International Classification of Diseases, Ninth Revision* (ICD-9-CM), used during 2010–2015 or *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM), used during 2016–2017: ICD-9-CM 460, ICD-10-CM J00, ICD-9-CM 464.xx, ICD-10-CM J04 and J05, ICD-9-CM 465.xx, ICD-10 CM J06, or ICD-9-CM 786.2, ICD-10 CM R05.
§ Antimicrobial medications included drugs categorized as anti-infectives, derived from Level 1 therapeutic categories from Multum Lexicon Plus.
¶ Based on a sample of visits to emergency departments in noninstitutional general and short-stay hospitals, exclusive of federal, military, and Veterans Administration hospitals, located in the 50 states and the District of Columbia.

From 2010–2013 to 2014–2017, the percentage of emergency department (ED) visits for acute viral upper respiratory tract infection that had an antimicrobial given or prescribed, hereafter referred to as ED visits, decreased from 23.4% to 17.6%. A decline was also seen for ED visits by children, decreasing from 17.9% to 10.1%, but a decline was not seen for ED visits by adults. In both periods, the percentage of ED visits by adults was higher than the percentage of ED visits by children.

Source: National Center for Health Statistics. National Hospital Ambulatory Medical Care Survey, 2010–2017. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Datasets/NHAMCS.

Reported by: Jill J. Ashman, PhD, JAshman@cdc.gov, 301-458-4439; Loredana Santo, MD; Carol J. DeFrances, PhD.

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format. To receive an electronic copy each week, visit *MMWR* at *https://www.cdc.gov/mmwr/index.html*.

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