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Severe and Fatal Rocky Mountain Spotted Fever After Exposure in Tecate, Mexico — California, July 2023–January 2024

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Abstract

Rocky Mountain spotted fever (RMSF) is a tickborne disease endemic in areas of the Americas. Persistent high incidence of the disease exists in northern Mexico, perpetuated by local populations of brown dog ticks (*Rhipicephalus sanguineus* sensu lato) and free-roaming dogs. Six cases of RMSF caused by *Rickettsia rickettsii*, including three deaths, were reported to the California Department of Public Health during July 2023–January 2024. All six patients were eventually determined to have had exposure to *R. rickettsii* in Tecate, Mexico, a municipality on the U.S. border that had not been previously described as a high-risk RMSF area. Identification and reporting of the cases were complicated by challenges in diagnosis. The serious nature of the disease and delays in initiating appropriate treatment can result in life-threatening consequences. Epidemiologic collaborations among local, state, federal, and international public health agencies were essential to identifying Tecate as the location of exposure. Further collaborations will be important for directing future prevention measures. Increased health care provider awareness of RMSF is critical on both sides of the border to facilitate earlier diagnosis and initiation of appropriate treatment.

Investigation and Results

Identification of Cases

Cases of Rocky Mountain spotted fever (RMSF), a life-threatening tickborne disease caused by *Rickettsia rickettsii*, are reported electronically to the California Department of Public Health (CDPH) from commercial laboratories or county health departments. Local health departments investigate cases collaboratively with agencies including CDPH, local vector control, and CDC. In October 2023, CDPH was notified of *R. rickettsii* detection using a Karius Test (Karius, Inc.), a microbial cell-free DNA (mcf DNA) assay on a whole blood specimen from a patient with fatal suspected RMSF. The CDPH-Viral and Rickettsial Disease Laboratory (VRDL) confirmed the result by real-time reverse transcription–polymerase chain reaction (RT-PCR) testing (*1*). One week later, a second fatal case of RMSF was identified by RT-PCR at the CDPH-VRDL, and formalin-fixed, paraffin-embedded (FFPE) tissue tested positive by PCR at CDC (*2*). Additional cases were identified retrospectively through inquiries to local border county hospitals and prospectively through CDPH communication with California public health officials. This

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activity was reviewed by CDC, deemed not research, and was conducted consistent with the applicable federal law and CDC policy.*

Patient Characteristics

The six RMSF patients ranged in age from 17 months to 65 years, and all but one were male (Table). Three of the patients were U.S. residents. Interviews with surviving patients or their family members revealed that each patient had traveled to or lived in Tecate, Mexico within 8 days of illness onset. All had exposure to dogs in Tecate; one patient reported a tick bite. No patients had known relationships with one another, except for patients B and C described below.

Patient A, a child aged 17 months, was evaluated in a Tecate clinic in July 2023 for fever and presumed gastroenteritis and received amoxicillin-clavulanic acid on the second day of illness. He vomited after 2 doses of antibiotics, and 1 day later developed a rash. The following week, he was seen in an emergency department (ED) in San Diego, California, where differential diagnoses included viral exanthem and a drug reaction. On illness day 7, he was taken again to a clinic in Tecate and was prescribed a cephalosporin antibiotic, which he tolerated; however, his symptoms did not abate. On day 10, he became lethargic and difficult to arouse and was taken to a tertiary care facility in San Diego. At the San Diego facility, a petechial rash on palms and soles of feet and on oral mucosa prompted consideration of a diagnosis of bacterial meningitis or rickettsial disease, and antibiotic coverage was broadened to include doxycycline. Blood was sent to Karius laboratories where *R. rickettsii* mcf DNA was detected; the diagnosis was later confirmed at CDPH-VRDL by RT-PCR (Table). After >2 weeks of hospitalization, the patient recovered. Exposure included visiting Tecate, where his family reported large numbers of ticks, dogs, and other apparent human cases of RMSF-like illness in the community.

Patients B and C were siblings aged 4.5 and 3 years, respectively, who became ill on the same day in August 2023 in Tecate. A tick was removed from patient C at home 2 days before symptom onset; when the tick attached was not known. Both children developed a rash, initially thought to be varicella, 2 days after the tick was found and removed from patient C, and both became lethargic over the next 2 days. Patient B developed diarrhea and respiratory difficulty, and the rash on both children spread to involve the whole body. Health care was sought in California on the fifth day of illness; patient B succumbed to cardiac failure en route to the health care facility. RT-PCR testing of a postmortem blood specimen returned a positive result for *R. rickettsii*. FFPE tissue from multiple organs (skin, kidney, liver, spleen, thymus, testis, adrenal gland, and tongue) obtained at autopsy and evaluated at CDC's Infectious Diseases Pathology Branch indicated extensive, predominantly small-vessel, vasculitis and abundant antigens of spotted fever group *Rickettsia* when stained using immunohistochemistry

*45 C.F.R. part 46,21 C.F.R. part 56; 42 U.S.C. Sect. 241 (d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

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TABLE. Characteristics of six patients who received diagnoses of Rocky Mountain spotted fever with exposure in Tecate, Mexico — California, 2023–2024

Characteristic	Patient A	Patient B	Patient C	Patient D	Patient E	Patient F
Age, sex	17 mos, M	4.5 yrs, M	3 yrs, M	65 yrs, M	17 yrs, F	13 yrs, M
Onset mo, yr	Jul 2023	Aug 2023	Aug 2023	Oct 2023	Oct 2023	Jan 2024
Symptom/Treatment, no. of days from onset/Action						
Onset of cutaneous manifestations	2	1 (approx.)	1 (approx.)	7	12 (approx.)	3
Start of doxycycline treatment	10	NA	5	7	10	6
Sample collection*	10, a	5, a	5, a 6, b	5, a	9, a 12, b 15, c postmortem, d	6, a
Sample collection*/ Laboratory results* (testing location)†	a arius pos (comm.); RT-PCR pos IgG = 1:256 (VRDL)	a PCR pos Molecular evidence of *R. rickettsii* in kidney, liver, and other tissues; IHC evidence *Rickettsia* sp. spleen and other tissues. (CDC)	a IgG neg (comm.); b Karius pos (comm.); RT-PCR pos (VRDL)	a IgG = 1:64 (comm.); RT-PCR pos IgG = 1:2,048 (VRDL)	a Karius pos (comm.); RT-PCR pos (VRDL) b IgG = 1:128 (comm.); c IgG = 1:512 (comm.); RT-PCR neg (VRDL) d Molecular evidence of *R. rickettsii* in liver; IHC evidence of spotted fever group *Rickettsia* sp. (CDC)	a IgM = 1:128 IgG neg (comm.); Karius pos (comm.); RT-PCR pos (VRDL)
Outcome	Survived	Died	Survived	Died	Died	Survived
Exposure in Tecate; for nonresidents, no. of days before onset	Visited Tecate for 14 days when illness began	Tecate resident	Tecate resident	7	8 (approx.)	Tecate resident
Classification	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed	Confirmed

Abbreviations: approx. = approximately; comm. = commercial laboratory; F = female; IgG = immunoglobulin G; IgM = immunoglobulin M; IHC = immunohistochemistry; M = male; NA = not available; neg = negative; pos = positive; RT-PCR = reverse transcription–polymerase chain reaction; VRDL = Viral and Rickettsial Disease Laboratory.

* Order of sample collections indicated by letters a–d: a = first, b = second, c = third, and d = fourth.

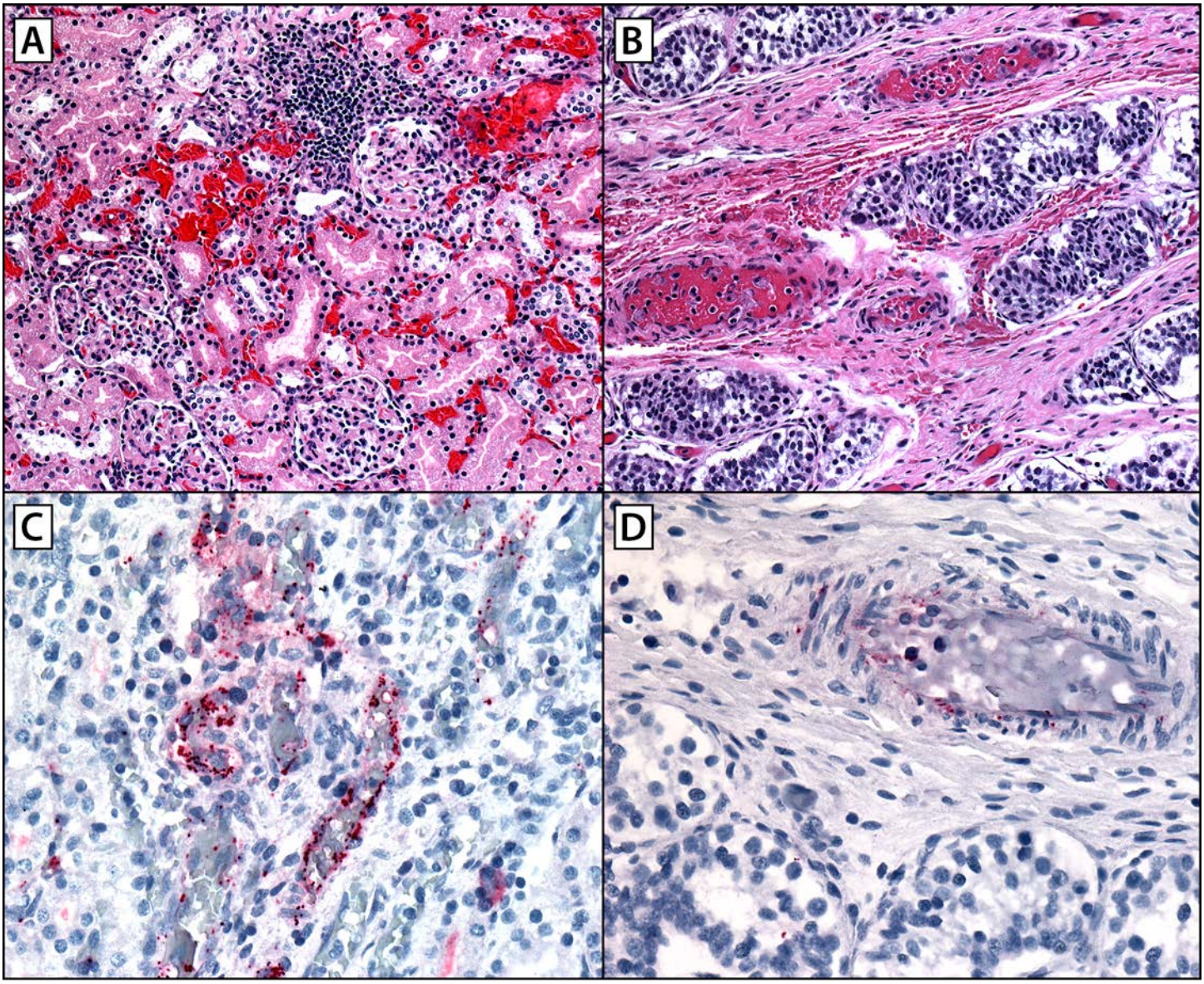
† All RT-PCR tests were conducted at the California Department of Public Health,VRDL; the Karius Test is a proprietary commercial microbial cell-free DNA metagenomic test performed by Karius, Inc. laboratories.

(IHC) (Figure 1). DNA extracts from IHC-reactive FFPE tissue blocks were positive for *R. rickettsii* by PCR. Patient C was taken to a tertiary care facility in San Diego, where treatment with doxycycline was started in the ED because of a high index of suspicion for RMSF; the diagnosis was confirmed 2 days later by a Karius Test positive for *R. rickettsii* mcf DNA. Patient C's evaluation in San Diego included magnetic resonance imaging of the brain, which showed small foci of signal abnormality in the white matter (known as a "starry sky" appearance), a finding highly associated with RMSF (Figure 2).

Patient D, a man aged 65 years, was evaluated in a San Diego ED in October 2023 after 4 days of abdominal pain with fever, malaise, and body aches. Severe thrombocytopenia prompted concern for thrombotic thrombocytopenic purpura, and he was admitted to an intensive care unit. A diffuse petechial rash developed on day 7 of illness, prompting administration of doxycycline because of suspicion of RMSF. Respiratory failure ensued, and the patient died on the same day. A family interview revealed that he had traveled to a rural area of Tecate 1 week before illness onset and had noted the presence of free-roaming dogs.

Patient E, an adolescent girl aged 17 years, was seen at a California ED in October 2023 after 4 days of a sore throat, myalgias, and headaches. A drop in blood pressure and the onset of abdominal pain while seeking care with a primary care provider prompted admission to the hospital where her illness was determined to be consistent with sepsis. Despite broad antibiotic coverage (not including doxycycline), she developed respiratory failure and a brain injury. A Karius Test ordered on day 9 of illness was positive for *R. rickettsii* mcf DNA, and doxycycline was added to the treatment. A scattered petechial and papular rash over her extremities was identified on day 15 of illness, and she died on day 16. No ticks were found near her home in California; family interviews revealed that the patient had traveled to Tecate 8 days before illness onset.

FIGURE 1. Histopathologic findings in a fatal pediatric case of Rocky Mountain spotted fever indicating extensive microhemorrhages, vascular inflammation, and endothelial injury in multiple organs including kidneys (A), testes (B), and rickettsial antigens identified by immunohistochemistry distributed predominately in endothelial cells of capillaries, arterioles, and venules in the vasa recta in the kidneys (C), and in interstitial areas in the testes (D) — California, August 2023



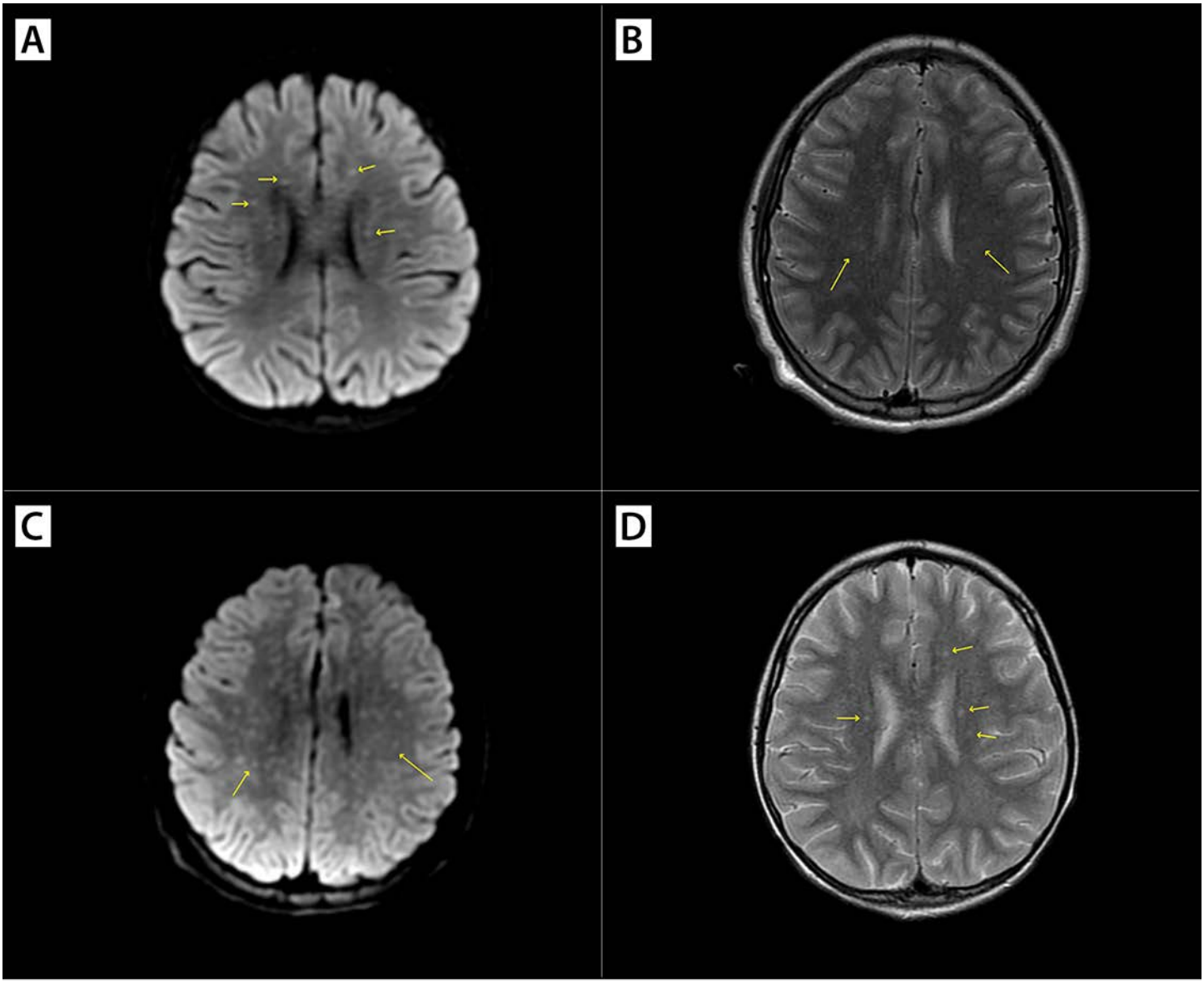
Photos/Infectious Disease Pathology Branch, CDC

Patient F, an adolescent boy aged 13 years, became ill with cough and fever in January 2024 while in Tecate. His family reported a small red bump on his arm 1 week earlier that developed into a dark scab. A rash appeared over a majority of his body 2 days later. Health care was sought at an ED in San Diego. He was started on doxycycline because of suspicion of RMSF. A magnetic resonance imaging of the brain demonstrated a small foci of signal abnormality in the white matter (Figure 2). After a 35-day hospitalization, he completed 2 weeks of rehabilitation before discharge.

Public Health Response

This outbreak of severe and fatal RMSF after exposures in Tecate, Mexico prompted communications among CDPH, CDC, and Baja California public health officials, who confirmed that the number of RMSF cases was increasing in

FIGURE 2. Magnetic resonance imaging findings*,† for cases of Rocky Mountain spotted fever in two residents of Tecate, Mexico (a child aged 3 years [A and B] and an adolescent aged 13 years [C and D]) with small foci of signal abnormality in the white matter indicated ("starry sky" appearance)§ — California, August 2023



Photos/County of San Diego Health and Human Services Agency, San Diego, California
* Axial diffusion-weighted imaging, panels A and C.
† Axial T2-weighted imaging, panels B and D.
§ Multiple punctate foci of reduced diffusivity and edema, suggesting white matter ischemic foci associated with vasculitis.

Tecate. To increase awareness among health care providers and travelers regarding RMSF and the risk posed by exposure to dogs and ticks in northern Mexico, various health alerts were issued: a Health Alert Network (HAN) health advisory in San Diego County (November 3, 2023), a National HAN Advisory (December 8, 2023), and a Travel Health Notice (March 12, 2024). In addition, a coordinated multinational health care provider education activity for approximately 200 health care workers at the two principal hospitals in Tecate was coordinated by the Instituto de Servicios de Salud Pública del Estado de Baja California (Institute of Public Health Services of the State of Baja California) and CDC in May 2024 to provide information on the emerging risk, diagnosis, and treatment of RMSF. Since January 2024, no additional cases with exposure in Tecate, Mexico have been reported in California; one case with exposure in Mexicali, Mexico has been reported.

Summary

What is already known about this topic?

Rocky Mountain spotted fever (RMSF) is a tickborne disease endemic in areas of the Americas. Persistent high incidence of the disease exists in northern Mexico, perpetuated by local populations of brown dog ticks (*Rhipicephalus sanguineus* sensu lato) and free-roaming dogs.

What is added by this report?

During July 2023–January 2024, six cases of RMSF in persons with exposure in Tecate, Mexico were reported to the California Department of Public Health; three patients died. This outbreak highlights a newly recognized location in Baja California with high RMSF risk.

What are the implications for public health practice?

Increased awareness of RMSF among health care providers on both sides of the border between the United States and Mexico would facilitate prompt treatment and help prevent fatalities.

Discussion

Rocky Mountain spotted fever is a severe tickborne disease endemic in the Americas. Since the beginning of the 21st century, hyperendemic[†] levels of RMSF have emerged on tribal lands in the southwestern United States and across multiple states of northern Mexico (*3*,*4*), including several border cities of Baja California (*5*,*6*), where the brown dog tick (*Rhipicephalus sanguineus* sensu lato) serves as the principal vector.

The identification of six confirmed cases of RMSF in southern California over 6 months is unusual; during 2011–2019, an average of one confirmed RMSF case per year was reported for the state of California (*6*). Because all patients included in this report had lived in or traveled to Tecate, Mexico within the 14-day RMSF incubation period, this investigation highlights the risk for RMSF along the border region. Vector-control inspection of patients' homes in California was important to identify whether exposure was local or occurred in Mexico or elsewhere, as described for other California cases (*7*). Fatal RMSF cases acquired in Mexico have been documented in other U.S. border states, including Arizona (*8*). Cross-border collaboration and communication among health authorities to effectively monitor, report, and respond to this disease are critical (*3*).

The clinical and diagnostic challenges observed during treatment for these patients underscore the challenges associated with diagnosing RMSF, particularly in localities where RMSF is rarely encountered (*9*). Initial signs and symptoms, including fever, cough, or abdominal pain, can mimic those of other diseases. If RMSF is suspected, treatment should begin immediately because there are no rapid, point-of-care diagnostic tests to confirm acute disease. Molecular testing, either targeted RT-PCR (*1*) or metagenomic testing, have improved diagnostic sensitivity during the acute phase of disease; the Karius Test was essential for the diagnosis or confirmation of RMSF cases among four of these patients. However, the rapid clinical progression of RMSF from a moderately severe illness to a life-threatening disease necessitates early initiation of doxycycline, as soon as the disease is suspected clinically, without waiting for confirmation of the diagnosis (*10*).

Implications for Public Health Practice

This outbreak highlighted a new area of RMSF risk in Mexico and underscored the need for health care provider awareness on both sides of the U.S.-Mexico border to treat suspected RMSF patients quickly with doxycycline to reduce risk for death. Collaborative activities among local, state, and international health agencies were necessary for determining exposure and establishing diagnosis for some of these patients. Continued binational collaborations on surveillance and communication will be important for future prevention measures.

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[†] Hyperendemic RMSF is defined as persistence of regional foci of disease in locations where the annual incidences consistently exceed the national annual incidence.

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Detection of Increased Activity of Human Parvovirus B19 Using Commercial Laboratory Testing of Clinical Samples and Source Plasma Donor Pools — United States, 2024

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Abstract

In most persons, human parvovirus B19 (B19) causes a mild respiratory illness, but infection can result in adverse health outcomes in persons who are pregnant, immunocompromised, or who have chronic hemolytic blood disorders. During the first quarter of 2024, several European countries reported increases in B19 activity. In the United States, there is no routine surveillance for B19. To assess increases in B19 activity in the United States, trends in testing and results from two independent populations were examined: 1) the presence of immunoglobulin (Ig) M antibodies, a marker of recent infection, in clinical specimens ordered by physicians and 2) B19 nucleic acid amplification testing (NAAT) in pooled donor source plasma from a large commercial laboratory during 2018–2024. The proportion of IgM-positive clinical specimens reached 9.9% in the second quarter (Q2) of 2024 after remaining <1.5% during 2020–2023 and was higher than Q2 peaks in 2018 (3.8%, p<0.001) and 2019 (5.1%, p<0.001). The prevalence of B19–NAAT-positive donor pools (512 donations per pool) reached 20% in June 2024 after remaining <2% during 2020–2023 and was higher than peaks in 2018 (6.7%, p<0.001) and 2019 (7.3%, p<0.001). Considering the B19 activity increase in the United States in 2024, promotion of measures to prevent respiratory viruses and monitor for adverse B19-related outcomes by health care providers and public health authorities might reduce adverse health outcomes in pregnant persons and others at increased risk.

Introduction

Human parvovirus B19 (B19) is a seasonal virus primarily transmitted through the air.† B19 infection can be transmitted from a mother to the fetus during pregnancy and, rarely, through transfusion of blood components and certain plasma derivates. Most persons become infected with B19 during their school years. Immunity from infection is thought to be lifelong. The population prevalence of protective antibodies increases with age from 50% at age 20 years to approximately 70% by age 40 years (*1*).

In immunocompetent children and adults, B19 infection typically causes a mild respiratory illness. B19 can cause transient aplastic anemia (low hemoglobin with decreased reticulocytes) in persons who have chronic hemolytic blood disorders (e.g., sickle cell disease, thalassemia, and hereditary spherocytosis), and persistent aplastic anemia in persons with certain immunocompromising conditions, such as hematologic malignancies (*2*). Acute infection during pregnancy can result in infection of the fetus, which can lead to fetal anemia, hydrops fetalis, and pregnancy loss in 5%–10% of cases (*3*). No vaccine or antiviral treatment for B19 infection exists.

In the first quarter of 2024, public health authorities in several European countries observed a significant increase in cases of B19 (*4*). Because there is no routine surveillance for B19 in the United States, to determine whether B19 activity increased in 2024, the prevalences of immunoglobulin (Ig) M antibody against B19 in clinical specimens submitted to a commercial laboratory§ and detection of B19 through nucleic acid amplification testing (NAAT) from pooled donor source plasma were examined.

Methods

Data Sources

Serum B19-specific IgM antibody,¶ a marker of recent infection, was assessed among adults aged ≥18 years and children and adolescents aged <18 years tested at Labcorp by physician request during January 1, 2018–August 31, 2024. Routine B19 screening using NAAT of pooled donor source plasma performed at Labcorp during the same period was also analyzed.**

Data Analysis

The number of clinical specimens tested for B19-specific IgM antibody and the proportion of positive test results were

* These authors contributed equally to this report.

† In the United States, B19 transmission generally occurs during late winter and early spring.

§ https://www.labcorp.com/

¶ IgM antibodies were assayed using a Food and Drug Administration (FDA)–cleared enzyme immunoassay. An index value of >1.1 indicates antibody detection. Isolated whole blood B19 NAAT tests accounted for 4.1% of all diagnostic testing and were not included in the analysis.

** Since 2009, FDA has recommended testing all plasma-derived products and plasma units for parvovirus B19 using nucleic acid tests. Whole blood is not screened for parvovirus B19 in the United States. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/nucleic-acid-testing-reduce-possible-risk-parvovirus-b19-transmission-plasma-derived-products

summarized monthly or quarterly by age, sex, and geographic region. Clinical specimen diagnostic test and pooled donor source plasma positivity rates were calculated as the total number of specimens considered positive divided by the number of specimens tested and the proportions of pooled specimens (512 donations per pool) with B19 detected above a 1,000 IU/mL threshold, respectively. Although the age and sex of plasma donors are unknown, historically, donor pool demographics have skewed toward males aged 20–29 years (*5*).

Peaks in positive B19 IgM and NAAT results during 2018–2019 (pre–COVID-19 pandemic), 2020–2023 (during the pandemic), and 2024 (postpandemic) were compared using Pearson's chi-square tests, and testing volumes were compared using t-tests; a two-sided p-value <0.05 was considered statistically significant. Analyses were performed in Python (Python Software Foundation; version 3.7) using the SciPy package (version 1.14.0). This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[††]

Results

B19 Diagnostic Testing

A total of 399,098 clinical specimens from 359,445 persons were tested for IgM antibodies during the study period. Among all clinical specimens, 369,536 (92.6%) were from adults (Supplementary Table, https://stacks.cdc.gov/view/cdc/170364); among these, 323,933 (87.7%) specimens were from women. Among specimens from children and adolescents, 15,115 (51.1%) were from females. There was no significant change in the number of specimens tested during each 6-month period between prepandemic and postpandemic periods (p = 0.05).

Among adults, the percentage of tests conducted by age group remained similar over the entire study period, with patients aged 30–39 years representing an average of 43.0% of total tests per quarter. Among children and adolescents, the highest and lowest prevalences of testing were among those aged 15–17 years (24%) and 0–2 years (9%), respectively. Children and adolescents aged 3–14 years accounted for 14%–18% of quarterly tests (Supplementary Figure 1, https://stacks.cdc.gov/view/cdc/170365).

IgM-Positive B19 Test Results

B19 infections, as detected by serum IgM antibodies, followed seasonal trends. In 2018 and 2019, the percentage of IgM-positive B19 test results peaked in the second quarter (Q2) of the year (April–June) for both children and adolescents (10.7% and 15.6%, respectively) (Figure 1) and adults (2.9% and 4.0%, respectively) (Figure 2). The prevalence of IgM-positive B19 test results in 2018–2019 reflects usual B19 detection in the United States. During 2020–2022, IgM seroprevalence remained low (<2%) among all age groups. The percentage of IgM-positive B19 test results began increasing from pandemic levels during the second half of 2023, and by Q2 of 2024, the percentages of IgM-positive B19 test results among children and adolescents (24.9%) and adults (5.1%) were significantly higher than were Q2 peaks during 2018 and 2019 (p<0.001 for both age groups for both years). The highest percentages of IgM-positive B19 test results in 2024 were among children aged 6–8 years (39.9% in Q2), followed by those aged 9–11 years (34.3% in Q2) (Figure 1). Among adults, the highest percentage of IgM-positive B19 results was observed in those aged 40–49 years (12.9% in Q2 2024) (Figure 2). Increases in the percentage of IgM-positive B19 results in 2024 compared with 2018–2019 were observed in all U.S. Department of Health and Human Services regions,[§§] with the highest proportion of positive tests in Q2 of 2024 observed in regions 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin [11.2%]), 6 (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas [10.0%]), 8 (Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming [9.1%]), and 10 (Alaska, Idaho, Oregon, and Washington [10.4%]) (Supplementary Table, https://stacks.cdc.gov/view/cdc/170364) (Supplementary Figure 2, https://stacks.cdc.gov/view/cdc/170366). As of August 31, 2024, the peak in IgM-positive B19 test results was declining as in previous seasonal cycles.

Donor Source Plasma Pool Testing

Donor source plasma pools, collected and tested for B19 using NAAT during the same period, followed similar trends to those observed in clinical specimen testing. A mean of 1,059 donor pools per month (SD = 246) were tested during the study period. The proportions of B19-DNA NAAT test results above a threshold of 1,000 IU/mL were elevated in July 2018 (7%) and July 2019 (8%), diminished during 2020–2023 (<2%), and reached their highest levels in June 2024 (20%) (Figure 3).

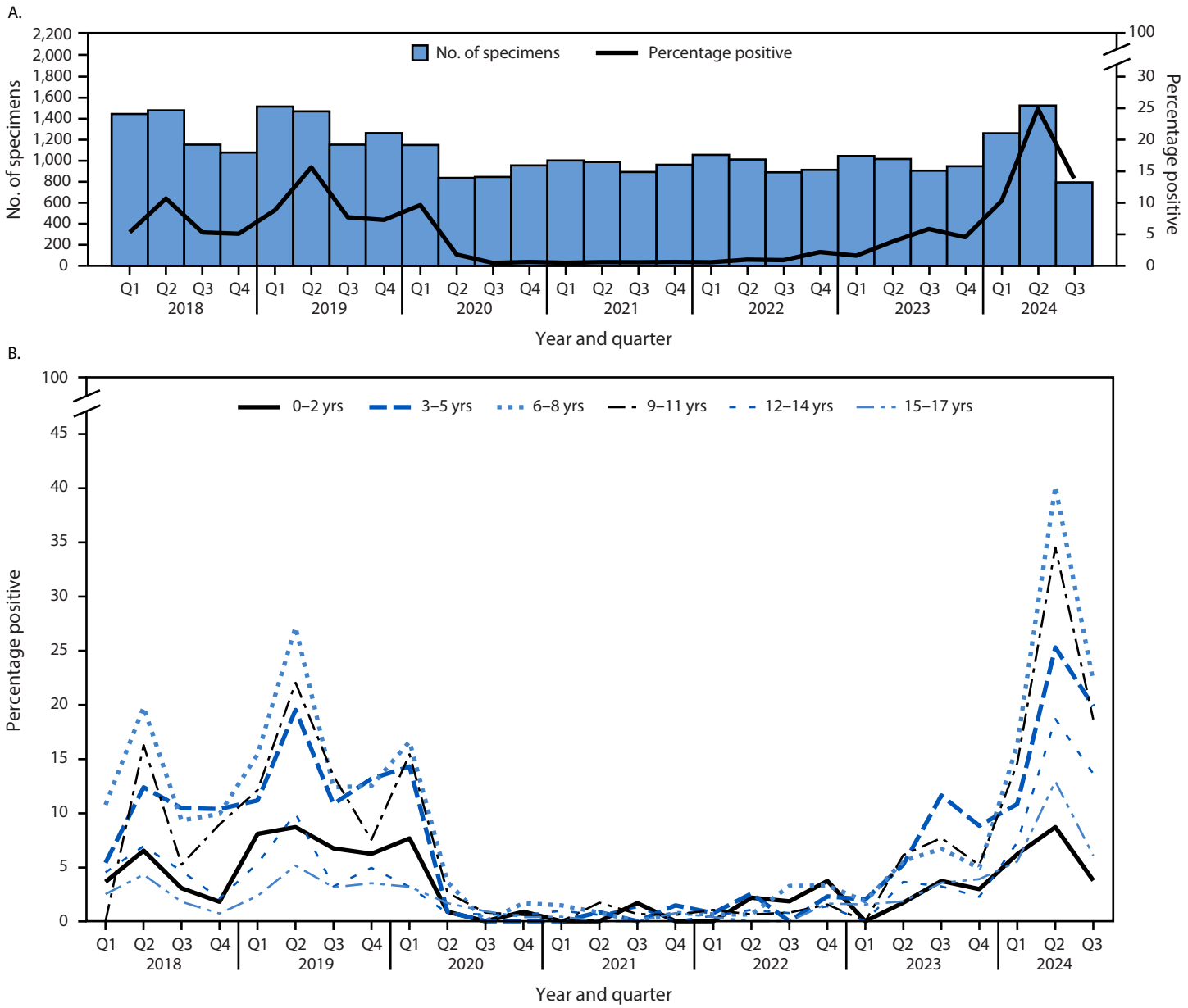
Discussion

During the period before the COVID-19 pandemic, typical B19 transmission patterns were observed, with expected peaks in the percentage of IgM-positive clinical specimens and B19 NAAT–positive source plasma donor pools in Q2 of each year. During the COVID-19 pandemic, B19 testing of

[††] 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

[§§] https://www.hhs.gov/about/agencies/iea/regional-offices/index.html

FIGURE 1. Number of clinical human parvovirus B19 specimens tested for immunoglobulin M and percentage of positive test results among children and adolescents aged <18 years, by quarter (A), and percentage of positive test results, by age group and quarter (B) — United States, 2018–2024*,†

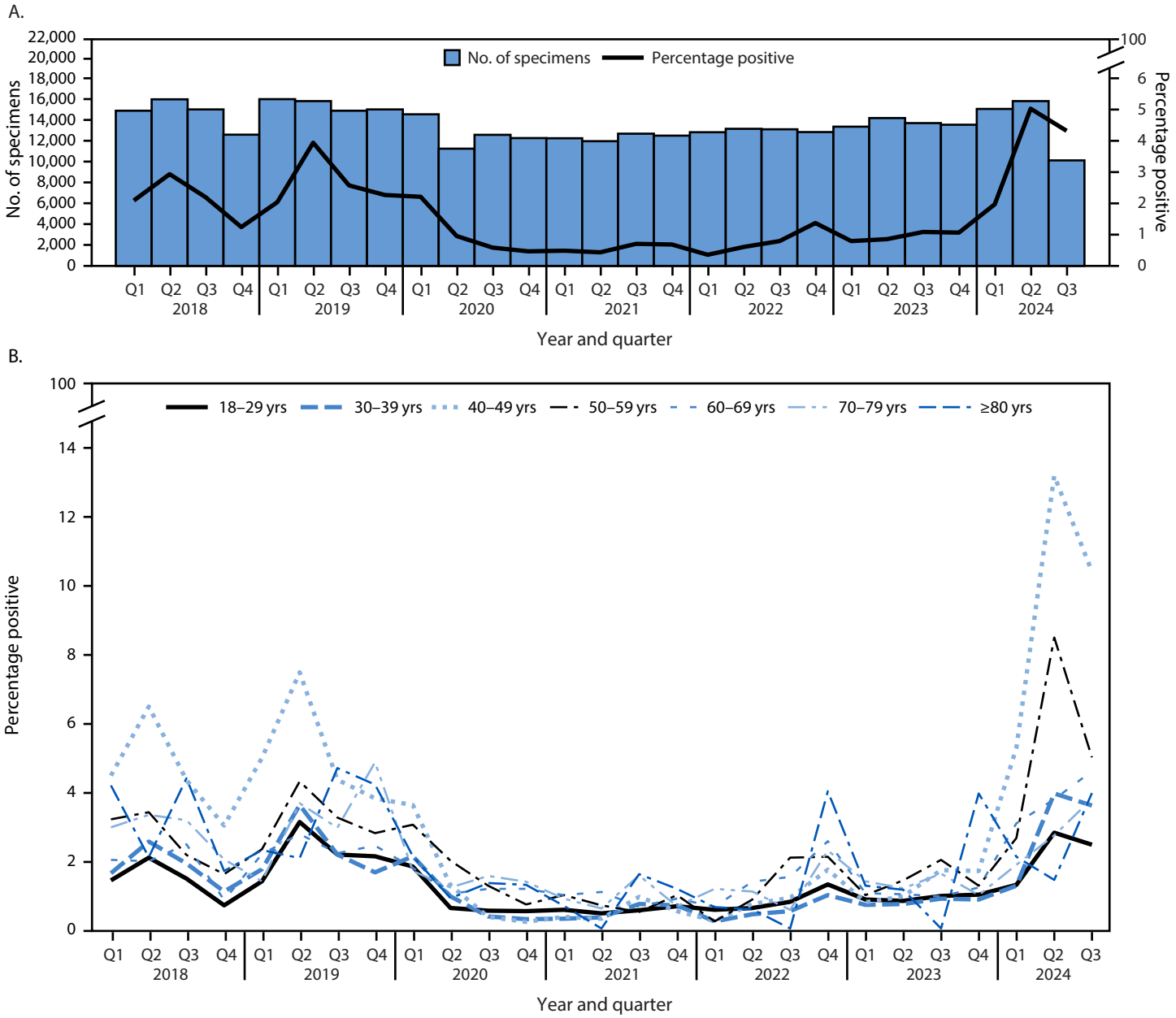


Abbreviation: Q = quarter.
* Q1 = January–March; Q2 = April–June; Q3 = July–September; Q4 = October–December.
† Data for 2024 are through August 31.

clinical specimens and source plasma donor pools decreased, and very low percentages of tests were positive. In 2024, the number of clinical specimens and source plasma donor pools tested for B19 returned to prepandemic levels, but the percentage of positive test results was higher compared with that during seasonal peaks observed during the prepandemic period. The increased percentage of positive tests in 2024 compared with that during prepandemic periods was observed in two independent populations (patients being tested for B19 by health care providers and healthy plasma donors) suggesting increased community transmission of B19 in 2024. This increase in community transmission is likely due to decreased B19 transmission during the COVID-19 pandemic, resulting from COVID-19 mitigation measures, leading to higher numbers of persons susceptible to B19 (*6*).

Patterns of transmission in 2024 were similar to those observed in prepandemic years. Peaks in the percentages of positive test results occurred in Q2 of the year, and the highest

FIGURE 2. Number of clinical human parvovirus B19 specimens tested for immunoglobulin M and percentage of positive test results among adults aged ≥18 years, by quarter (A), and percentage of positive test results, by age group and quarter (B) — United States, 2018–2024*,†



Abbreviation: Q = quarter.
* Q1 = January–March; Q2 = April–June; Q3 = July–September; Q4 = October–December.
† Data for 2024 are through August 31.

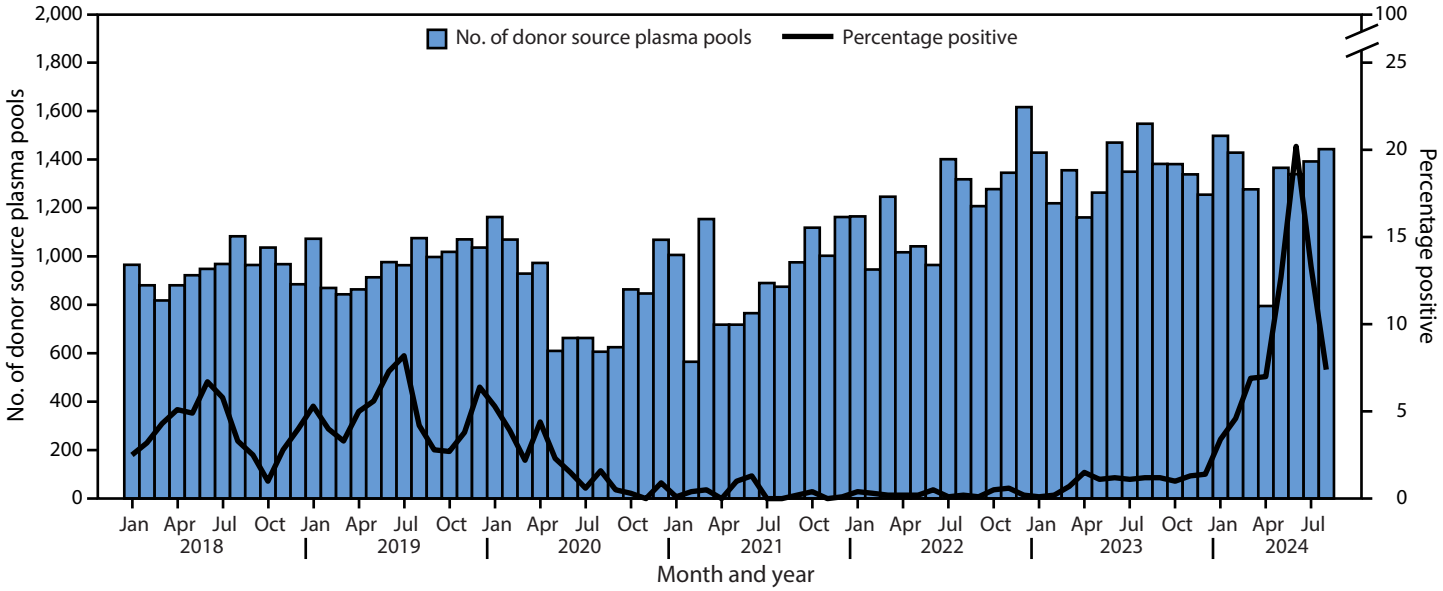
percentages of positive test results were among children aged 6–11 years. The percentage of IgM-positive B19 test results in most adult age groups in 2024 returned to prepandemic levels; however, compared with previous years, the percentage of positive B19 tests in adults aged 40–59 years was higher in 2024 than in previous years.

Health care providers, public health authorities, and the public should be aware of the likely increased circulation of B19 in the United States. CDC continues to examine syndromic surveillance and electronic health care databases to assess increases in B19 complications or adverse outcomes among groups at higher risk.

Limitations

The findings in this report are subject to at least four limitations. First, Labcorp represents only one large laboratory network, and data are not deduplicated to the patient level. The extent to which changes in testing volume might

FIGURE 3. Number of donor source plasma pools* tested for human parvovirus B19 and the percentage of pools positive† by nucleic acid amplification testing — United States, 2018–2024§



* The number of individual donations per pool was 512.
† B19 DNA detected above a 1,000 IU/mL threshold was considered positive.
§ Data for 2024 are through August 31.

Summary

What is already known about this topic?

Human parvovirus B19 (B19) is a seasonal respiratory virus that causes mild disease in most persons; severe outcomes can occur in persons who are pregnant, immunocompromised, or have chronic hemolytic disorders.

What is added by this report?

Although no routine B19 surveillance exists in the United States, in 2024, a large U.S. commercial laboratory observed increases in percentages of positive B19 test results in clinical specimens and pooled donor source plasma compared with levels during 2018–2019.

What are the implications for public health practice?

Health care providers should be aware of increased B19 activity, consider testing persons at high risk for adverse B19-related outcomes, and monitor high-risk patients for complications.

be due to changes in laboratory market share or physicians' test-ordering practices could not be determined, although the percentage of positive test results should not be substantially affected. Second, the demographic data available with clinical specimens is limited and precluded assessment of differences by race or ethnicity. Third, testing of clinical specimens depends on access to health care, provider recognition of potential B19 infection, and concern about development of severe B19 complications, and might therefore only represent the higher-risk or more severe B19 infections, underestimating the increase in B19 transmission and infection in the broader community. Although testing of source plasma donor pools corroborates increased community transmission, donors are not representative of the U.S. population. Finally, because positive test results could not be linked to clinical outcomes, this analysis could not assess a change in complications or adverse outcomes among groups at higher risk, including persons who are pregnant, immunocompromised, or who have chronic hemolytic anemias.

Implications for Public Health Practice

CDC released a Health Advisory on August 13, 2024, with recommendations for health care providers, health departments, and the public (*7*). Although B19 causes mild disease in most persons, those who are pregnant, who have certain immunocompromising conditions (e.g., leukemia or other cancers, organ transplant, HIV infection, or current chemotherapy), or who have chronic hemolytic blood disorders (e.g., sickle cell disease, thalassemia, or hereditary spherocytosis) are at increased risk for severe complications from B19 infection. Health care providers should have an increased index of suspicion for B19 among persons evaluated with fever, rash, arthropathy, or unexplained anemia with low reticulocyte count and should consider B19 testing for persons at increased risk for severe complications, including pregnant persons who might have been exposed to B19. Some European countries have observed a significant increase in fetal morbidity and mortality several months after increased community transmission of B19 (*8*). Health care providers caring for pregnant persons

should be particularly vigilant for signs of reduced fetal movement or evidence of hydrops which could be associated with B19 (*9*). Transmission of B19 in the community and school setting can be mitigated by promoting prevention strategies against respiratory illness, such as taking steps for cleaner air (e.g., facilitating circulation of fresh outside air, purifying indoor air, or gathering outdoors), practicing good hygiene, masking, and following guidance for kindergarten through 12th grade schools (*10*). Persons at high risk for severe B19 complications who work or study in settings with elevated risk for B19 exposure should consider additional prevention strategies, such as masking, to reduce their risk for infection.

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Progress Toward UNAIDS Global HIV Pre-Exposure Prophylaxis Targets: CDC-Supported Oral Pre-Exposure Prophylaxis — 37 Countries, 2017–2023

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Abstract

Oral pre-exposure prophylaxis (PrEP) reduces HIV acquisition risk from sex by 99% and from injection drug use by ≥74% when used as recommended. The Joint United Nations Programme on HIV/AIDS (UNAIDS) has set a goal of 21.2 million persons using (initiating or continuing) PrEP globally in 2025. In 2016, CDC, with the U.S. President's Emergency Plan for AIDS Relief, joined ministries of health to implement PrEP globally. PrEP is beneficial for persons at substantial risk for acquiring HIV, including but not limited to key populations, which include female sex workers, men who have sex with men, persons in prisons and other enclosed settings, persons who inject drugs, and transgender persons. Annual country targets were used to guide scale-up. In 2023, CDC supported 856,816 PrEP initiations, which represents nearly one quarter of the 3.5 million persons globally who either initiated or continued PrEP that year. During 2017–2023, CDC supported PrEP initiations for 2,278,743 persons, 96.0% of whom were in sub-Saharan Africa. More than one half (64.0%) were female and 44.9% were aged 15–24 years. Overall, CDC achieved 118.7% of its PrEP initiation targets for the 7-year period. Among PrEP initiations for key populations, the majority in sub-Saharan Africa were female sex workers, whereas in Southeast Asia, Eurasia, and the Americas, the majority were men who have sex with men. Continued rapid scale-up is needed to meet the UNAIDS goal to end HIV as a public health threat.

Introduction

Oral pre-exposure prophylaxis (PrEP) reduces HIV acquisition from sex by 99% and from injection drug use by ≥74% when taken as recommended (*1*). In 2015, the World Health Organization recommended that persons at high risk for HIV infection be offered tenofovir-based oral PrEP as part of a comprehensive package of HIV prevention services (*2*). The Joint United Nations Programme on HIV/AIDS (UNAIDS) has set a goal of scaling up services to achieve 21.2 million persons using (initiating or continuing) PrEP globally during 2025 to end HIV as a public health threat by 2030* (*3*). The U.S. President's Emergency Plan for AIDS Relief (PEPFAR), with U.S. government agencies, including the Department of Defense, Agency for International Development, and CDC, provides support for PrEP through partnerships with host countries. Starting in 2016, CDC joined ministries of health in implementing PrEP globally with an initial focus on adolescent girls and young women aged 15–24 years (*4*). In 2020, many PEPFAR-supported countries integrated oral PrEP into their prevention activities. Depending on local HIV incidence patterns, prioritized populations included serodifferent couples (couples in which one partner is living with HIV and the other is not), pregnant and breastfeeding women, adolescent girls and young women, and groups categorized by PEPFAR as key populations. These groups include female sex workers, men who have sex with men (MSM), transgender persons, persons who inject drugs, and persons in prisons and other closed settings (*5*). In collaboration with ministries of health and others, PEPFAR develops annual targets for PrEP initiations for each implementing agency (including CDC) in each country, often based on program performance, financial support, and other factors, including coverage with other HIV interventions such as antiretroviral therapy. CDC supports PrEP programs in four regions including sub-Saharan Africa, Southeast Asia, Eurasia, and the Americas.† This report describes CDC-supported PrEP initiations globally for prioritized populations by region, sex, and age.

* This goal is also expressed as 10.6 million users throughout 2025, meaning 10.6 million person-years of use. UNAIDS has calculated that if the average duration of PrEP use is 6 months, 21.2 million persons using PrEP during 2025 would be needed to achieve the 10.6 million person-years. This calculation is also sometimes expressed as an approximate UNAIDS 2025 target of 10 million users.

† *Sub-Saharan Africa:* Botswana, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Eswatini, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe; *Southeast Asia:* India, Laos, Philippines, Thailand, and Vietnam; *Eurasia:* Kazakhstan, Kyrgyzstan, Tajikistan, and Ukraine; and *the Americas:* Brazil, Colombia, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, and Panama.

Methods

PrEP initiations from the PEPFAR Monitoring, Evaluation and Reporting Database were analyzed; these were reported semiannually until 2021 and quarterly thereafter, based on the U.S. fiscal year (October 1–September 30) (*6*). The annual number of PrEP initiations was defined as persons enrolled in tenofovir-based oral PrEP during each fiscal year. Annual CDC PrEP initiations during 2017–2023 were described, both overall and disaggregated by region, selected priority population groups (key populations and adolescent girls and young women), sex, and age. These initiations were also compared with CDC PrEP initiation targets to assess percentages achieved. Although programs started reporting PrEP initiations by key population in 2017, initiations by key populations were not reported uniformly until 2019. All analyses were performed using Stata software (version 16; StataCorp). This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[§]

Results

CDC-supported PrEP initiations in 37 countries increased from 11,397 in 2017 to 856,816 in 2023, approaching approximately 2.3 million total initiations (Table 1).[¶] Overall, CDC surpassed targets for PrEP initiations (118.7%) for the 7-year period. Annual achievement of CDC PrEP targets ranged among countries from 81.4% to 141.6%. In 2023, all four regions exceeded 100% of their annual target. More than one third (37.6%) of all initiations occurred in 2023.

Annual Number of PrEP Initiations by Region

Nearly all (96.0%; 2,187,946) of CDC-supported PrEP initiations occurred in sub-Saharan Africa, increasing from 11,302 in 2017 to 820,777 in 2023 (Table 1). Throughout the 7-year period, 1.9% of initiations occurred in Southeast Asia, 0.8% in Eurasia, and 1.3% in the Americas. The number of PrEP initiations in all regions combined increased annually, and in each region the largest number of PrEP initiations occurred in 2023. The largest year-to-year increases occurred in sub-Saharan Africa from 2020 to 2021 (220% increase), Southeast Asia and Eurasia from 2021 to 2022 (67% and 214% increases, respectively), and in the Americas from 2022 to 2023 (67% increase).

PrEP Initiation by Age and Sex

The majority of PrEP initiations in sub-Saharan Africa occurred among females (65.8%), whereas the majority in the other regions occurred among males: Southeast Asia (85.2%), Eurasia (73.8%), and the Americas (77.6%) (Table 2). More than one third (33.7%) of all PrEP initiations were among adolescent girls and young women in sub-Saharan Africa. The

TABLE 1. Annual number of newly initiated CDC-supported pre-exposure prophylaxis users and progress toward CDC targets — U.S. President's Emergency Plan for AIDS Relief, 37 supported countries, fiscal years 2017–2023*,†,§

Region	Fiscal year	PrEP initiations, no. (%)	Annual target	Annual target achieved, %
Sub-Saharan Africa	2017	11,302 (0.5)	11,091	101.9
	2018	38,056 (1.7)	32,388	117.5
	2019	68,104 (3.1)	59,583	114.3
	2020	135,775 (6.2)	171,433	79.2
	2021	435,213 (19.9)	457,637	95.1
	2022	678,719 (31.0)	475,293	142.8
	2023	820,777 (37.5)	630,397	130.2
	All years	**2,187,946 (96.0)**	**1,989,042**	**119.0**
Southeast Asia	2017	95 (0.2)	371	25.6
	2018	227 (0.5)	135	168.1
	2019	3,158 (7.5)	3,083	102.4
	2020	4,457 (10.6)	2,451	181.8
	2021	7,611 (18.0)	13,122	58.0
	2022	12,729 (30.2)	9,577	132.9
	2023	13,900 (33.0)	11,769	118.1
	All years	**42,177 (1.9)**	**40,130**	**105.1**
Eurasia	2017	0 (—)	—	—
	2018	130 (0.7)	500	26.0
	2019	881 (4.6)	2,097	42.0
	2020	1,273 (6.7)	1,526	119.9
	2021	1,937 (10.2)	2,783	69.6
	2022	6,087 (32.0)	5,439	111.9
	2023	8,741 (45.9)	684	1,277.9
	All years	**19,049 (0.8)**	**12,573**	**151.5**
The Americas	2017	0 (—)	—	—
	2018	137 (0.5)	150	91.3
	2019	463 (1.6)	799	57.9
	2020	2,836 (9.6)	2,426	116.9
	2021	4,718 (16.0)	4,281	110.2
	2022	8,019 (27.1)	8,414	95.3
	2023	13,398 (45.3)	12,280	109.1
	All years	**29,571 (1.3)**	**28,351**	**104.3**
Global	2017	11,397 (0.5)	11,465	99.4
	2018	38,550 (1.7)	33,175	116.2
	2019	72,606 (3.2)	65,588	110.7
	2020	144,341 (6.3)	177,323	81.4
	2021	449,479 (19.7)	478,169	94.0
	2022	705,554 (31.0)	498,272	141.6
	2023	856,816 (37.6)	655,058	130.8
	All years	**2,278,743**	**1,919,750**	**118.7**

Abbreviations: PEPFAR = U.S. President's Emergency Plan for AIDS Relief; PrEP = pre-exposure prophylaxis.

* U.S. fiscal year = October 1–September 30.

† Not all countries in each region reported PrEP initiations throughout the 7-year period.

§ PEPFAR Monitoring, Evaluation, and Reporting data from regions (countries): *sub-Saharan Africa* (Botswana, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Eswatini, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe); *Southeast Asia* (India, Laos, Philippines, Thailand, and Vietnam); *Eurasia* (Kazakhstan, Kyrgyzstan, Tajikistan, and Ukraine); and *the Americas* (Brazil, Colombia, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, and Panama).

[§] 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

[¶] Not all 37 countries were supported by CDC during the entire 7-year period, and not all countries reported PrEP initiations annually.

TABLE 2. Newly initiated CDC-supported pre-exposure prophylaxis users, by sex, age, and key population — U.S. President's Emergency Plan for AIDS Relief, 37 supported countries, fiscal years 2017–2023*,†

	All PrEP initiations, no. (%)								Key population initiations,§ no. (%)					
	Sex		Age group, yrs											
Region	Female	Male	15–24	25–34	35–44	≥45	Total	Adolescent girls and young women¶	Female sex workers	Men who have sex with men	Persons in prisons and other enclosed settings	Persons who inject drugs	Transgender persons	Total
Sub-Saharan Africa	1,436,782 (65.8)**	747,395 (34.2)	993,002 (45.4)	761,841 (34.8)	311,763 (14.2)	121,780 (5.6)	**2,188,386 (96.0)**	767,654 (33.7)	465,696 (63.4)	188,223 (25.6)	26,053 (3.5)	43,903 (6.0)	7,345 (1.0)	**731,220 (90.9)**
Southeast Asia	6,261 (14.8)	35,916 (85.2)	17,990 (42.9)	16,085 (38.4)	5,599 (13.4)	2,243 (5.4)	**41,917 (1.8)**	1,965 (0.1)	1,405 (4.1)	32,187 (93.4)	1 (0.0)	459 (1.3)	635 (1.8)	**34,460 (4.3)**
Eurasia	4,993 (26.2)	14,056 (73.8)	3,633 (19.1)	6,121 (32.2)	6,032 (31.7)	3,250 (17.1)	**19,036 (0.8)**	452 (0.0)	756 (5.5)	9,580 (69.2)	5 (0.0)	3,459 (25.0)	33 (0.2)	**13,833 (1.7)**
The Americas	6,618 (22.4)	22,953 (77.6)	9,301 (31.6)	13,723 (46.7)	4,817 (16.4)	1,563 (5.3)	**29,404 (1.3)**	2,110 (0.1)	4,572 (18.3)	19,315 (77.2)	58 (0.0)	293 (1.2)	766 (3.1)	**25,004 (3.1)**
Total	**1,454,654 (64.0)**	**820,320 (36.0)**	**1,023,926 (44.9)**	**79,770 (35.0)**	**328,211 (14.4)**	**12,8836 (5.7)**	**2,278,743 (99.9)††**	**772,181 (33.9)**	**472,376 (58.6)**	**247,387 (30.7)**	**26,117 (3.2)**	**48,049 (6.0)**	**8,675 (1.1)**	**804,517 (35.3)**

Abbreviations: PEPFAR = U.S. President's Emergency Plan for AIDS Relief; PrEP = pre-exposure prophylaxis.

* U.S. fiscal year = October 1–September 30.

† PEPFAR Monitoring, Evaluation, and Reporting data from regions (countries): *sub-Saharan Africa* (Botswana, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Eswatini, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe); *Southeast Asia* (India, Laos, Philippines Thailand, and Vietnam); *Eurasia* (Kyrgyzstan, Kazakhstan, Tajikistan, and Ukraine); and *the Americas* (Brazil, Colombia, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, and Panama).

§ Not all disaggregated indicators were reported throughout the 7-year period. Reporting by key population was not uniform across all countries until 2019.

¶ Females aged 15–24 years.

** Data on PrEP initiations by sex in sub-Saharan Africa were missing for some countries in 2017 and 2018.

†† Total percentage of PrEP initiations does not sum to 100 because of rounding.

largest percentage of initiations occurred among persons aged 15–24 years in sub-Saharan Africa (44.9%) and Southeast Asia (42.9%). The largest percentage of PrEP initiations in the Americas was among persons aged 25–34 years (46.7%) and in Eurasia, among persons aged 35–44 years (31.7%).

PrEP Initiation by Key Population

More than one third (35.3%) of all PrEP initiations occurred among persons who were reported to be members of a key population (Table 2). In sub-Saharan Africa, 63.4% of all PrEP initiations among key populations occurred among persons who reported being female sex workers; 25.6% occurred among persons who reported being MSM. In the other three regions, most PrEP initiations among key populations occurred among MSM: Southeast Asia (93.4%), Eurasia (69.2%), and the Americas (77.2%). Across all PrEP initiations among key populations, the lowest proportions occurred among transgender persons (1.1%), persons in prison and other enclosed settings (3.2%), and persons who inject drugs (6.0%). The highest proportion of persons who inject drugs among key populations initiating PrEP occurred in Eurasia (25.0%).

Discussion

CDC-supported PrEP initiations in 37 countries increased from 11,397 in 2017 to 856,816 in 2023, approaching 2.3 million total initiations. The largest increases were in sub-Saharan Africa, where most PrEP initiations occurred. Despite the impact of COVID-19 mitigation measures, the number of PrEP initiations continued to increase annually in 2020 and 2021, demonstrating programmatic effectiveness in rapidly adapting approaches to virtual and decentralized service delivery models (*7*). The number of PrEP initiations exceeded CDC targets (118.7% overall during 2017–2023). The 856,816 PrEP initiations supported by CDC represent approximately one quarter of the 3.5 million persons globally who either initiated or continued PrEP during 2023 (*3*). However, this number falls short of the UNAIDS target of 21.2 million persons initiating or continuing PrEP in 2025 (*3*). This gap highlights the ongoing need for more investment and innovation in expanding PrEP access worldwide.

Approximately one third of CDC-supported initiations occurred among key populations, an important accomplishment, given the stigma, discrimination, and legal barriers that can make it challenging for these groups to access HIV prevention services (*8*). In sub-Saharan Africa, adolescent girls and young women account for the largest proportion of new HIV infections (*9*) and accounted for approximately one third of CDC-supported PrEP initiations during 2017–2023. In Southeast Asia, Eurasia, and the Americas, most PrEP initiations occurred among MSM, consistent with the epidemiology of new HIV infections in these regions. Globally, the number of initiations among persons in prisons and other enclosed

Summary

What is already known about this topic?

Pre-exposure prophylaxis (PrEP) reduces the risk for HIV acquisition from sex by 99% and from injection drug use by ≥74% when used as recommended. Globally, 3.5 million persons initiated or continued PrEP during 2023, far fewer than the United Nations Programme on HIV/AIDS goal of at least 21.2 million persons initiating or continuing PrEP globally during 2025.

What is added by this report?

During 2017–2023, CDC supported 2,278,743 PrEP initiations in 37 countries, 118.7% of CDC's overall target for the 7-year period; 856,816 of the initiations occurred in 2023.

What are the implications for public health practice?

Additional scale-up is needed to meet the goal of 21.2 million persons using PrEP globally in 2025.

settings, persons who inject drugs, and transgender persons was relatively low, indicating a potential to expand programming among these populations. Alternatives to oral PrEP, including the dapivirine vaginal ring (for HIV risk resulting from sex) and long-acting injectable PrEP, have been introduced; however, implementation has been on a small scale. These options represent an opportunity to expand PrEP programming.

Limitations

The findings in this report are subject to at least five limitations. First, data quality issues include possible duplication of client records, reporting gaps, or data entry errors; these issues could result in potential over- or underestimation of initiations. Second, because PEPFAR Monitoring, Evaluation and Reporting data do not distinguish between new PrEP users and those who reinitiate at another clinic or under a different name, initiations could potentially be counted more than once. Third, this analysis describes the number of persons who initiated PrEP; however, because oral PrEP effectiveness depends on the degree of adherence, these data alone do not quantify prevention impact. This limitation warrants further analysis. Fourth, the number of PrEP initiations among key populations might be underreported by providers or PrEP users because of stigma, discrimination, and punitive laws. Finally, the number of PrEP initiations presented for each country includes only those supported by CDC, not the total number.

Public Health Implications

Given the UNAIDS estimate of 3.5 million persons using PrEP globally during 2023, substantial scale-up is needed to reach the 2025 target of 21.2 million persons to reach 2030 goals for ending HIV as a public health threat (*3*). Efforts are ongoing by CDC and others to enhance PrEP use by adapting to users' evolving needs, such as the demand for more convenient options (e.g., long-acting PrEP). Although PrEP initiations have scaled up substantially in sub-Saharan Africa, potential exists to further expand PrEP access both within the region and beyond PEPFAR-supported countries, particularly considering the increasing HIV incidence in countries outside of sub-Saharan Africa (*3*). Further expansion of PrEP programs that addresses barriers to initiation, including stigma, lack of awareness of PrEP services, and low risk perception among populations at high risk, could increase the number of persons initiating or continuing PrEP. The introduction and implementation of long-acting PrEP products, such as cabotegravir, might accelerate progress toward ending HIV as a public health threat.

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Notes from the Field

Human Parvovirus B19 Infections Among Pregnant Persons — Minnesota, January–September 2024

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Human parvovirus B19 (B19) commonly causes asymptomatic infection or mild illness in healthy children and nonpregnant adults, but infection during pregnancy can lead to severe perinatal sequelae, particularly when infection occurs before 20 weeks' gestation. In July 2024, the Minnesota Department of Health (MDH) was notified by a maternal-fetal medicine specialist of an increase in B19 infections among pregnant persons associated with fetal complications. Although increased circulation of B19 had not been described in the United States at that time, review of the literature revealed that European surveillance indicated increases in B19 in late 2023 and 2024 identified through laboratory, clinical, and blood donation screening data (*1*,*2*).

Investigation and Outcomes

Five cases of B19 infection among women aged 20–40 years who were evaluated during May–August 2024 were reported to MDH. No known epidemiologic links among the patients were identified, and the patients did not live in the same communities. Four patients had children in the household, including two who had ill children (one with B19-associated anemia requiring transfusion) and one who reported B19 circulating at her child's school. The fifth patient had presumed exposure as a provider at a child care facility where febrile rash illnesses were circulating among attendees.

Three patients had signs and symptoms consistent with B19 infection, including fever, rash, malaise, fatigue, arthralgias, and lymphadenopathy. All five patients had B19 infection at 13–20 weeks' gestation, laboratory-confirmed by immunoglobulin M or polymerase chain reaction (PCR) testing, including three who received positive B19 PCR amniotic fluid test results. None had immunocompromising conditions or blood disorders.

Patient A had fetal hydrops and experienced fetal demise at 20 weeks' gestation before fetal transfusion could be performed. Patient B was evaluated weekly for 3 months and did not experience complications; patients C and D developed severe fetal anemia requiring fetal transfusion; and patient E developed severe fetal anemia with hydrops (severe edema) requiring two fetal transfusions. Patients B, C, D, and E delivered full-term infants with no birth or neonatal complications identified (Supplementary Table, https://stacks.cdc.gov/view/cdc/170371).

The MDH Public Health Laboratory performed metagenomic sequencing to generate full genomes using amniotic fluid from two patients. Both samples were genotype 1A, the most commonly circulating genotype worldwide. Specimens differed by at least 35 single nucleotide polymorphisms and did not appear to be related through a recent shared source or transmission event. Comparisons to sequences available in the National Center for Biotechnology Information (https://www.ncbi.nlm.nih.gov/) database revealed no closely related sequences based on single nucleotide polymorphisms or clustering on a phylogenetic tree.

No routine surveillance for B19 exists in the United States. It is not a notifiable condition, and it is not a reportable disease in Minnesota. To evaluate overall B19 trends and frequency of pregnancy-associated complications, the Midwest Analytics and Disease Modeling Center[§] analyzed electronic health record data from 10 health systems provided through the Minnesota Electronic Health Record Consortium, among Minnesota residents during January 2019–September 2024 (Figure). This analysis identified an increase in parvovirus testing, positive tests, percentage of positive test results, and diagnoses in 2024 compared with 2019–2023, with the largest increases among children. During the 10-month period from January through September 2024, procedure and diagnosis codes identified 19 B19-associated pregnancy complications within 60 days of a B19 diagnosis or positive test result, including hydrops fetalis, fetal anemia and thrombocytopenia, fetal transfusion, or stillbirth. In comparison, during a 60-month period (2019–2023), 28 B19-associated pregnancy complications occurred. No increase in non–B19-associated fetal complications was identified during January–September 2024 compared with January 2019–December 2023.

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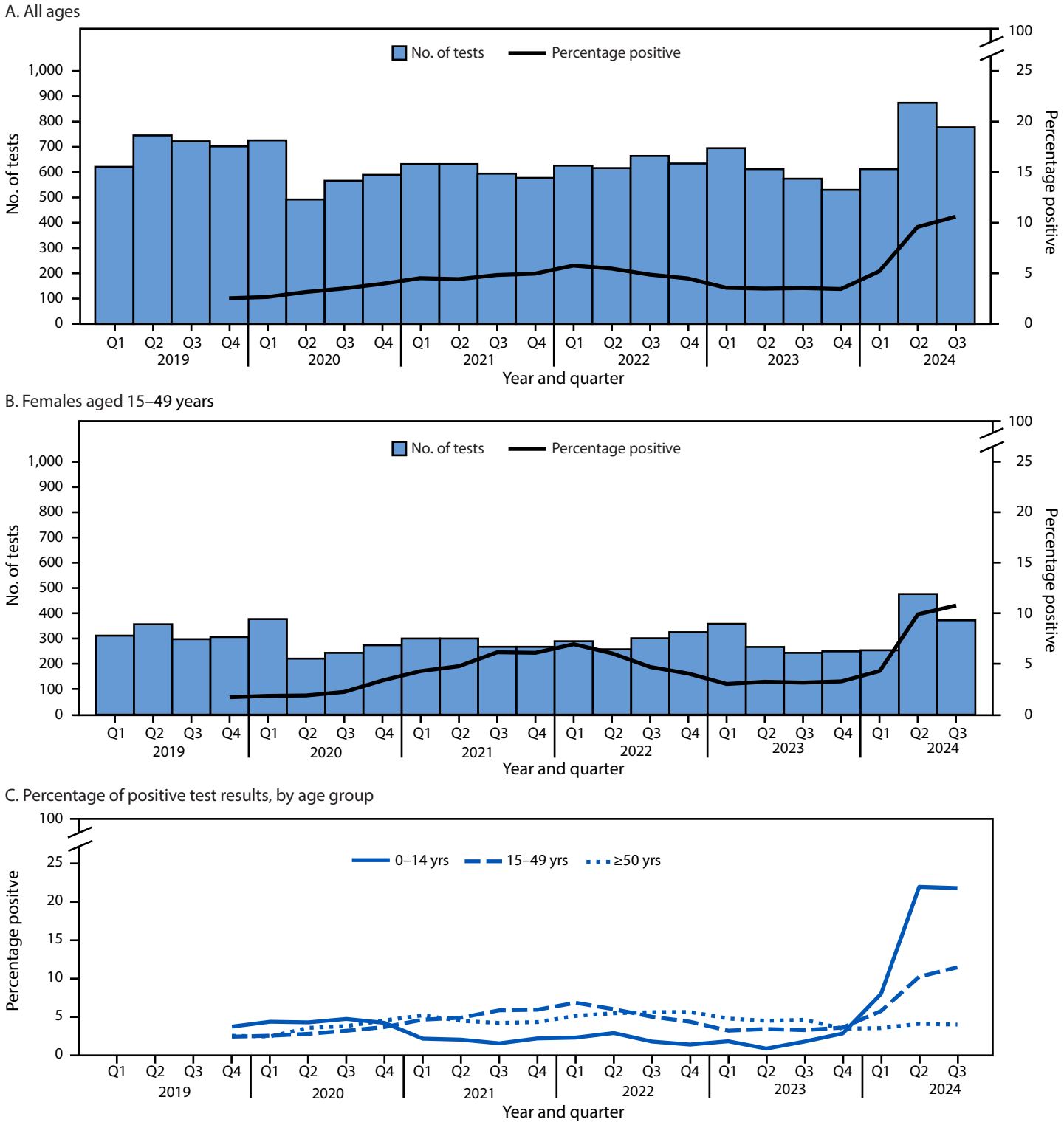
[†] These senior authors contributed equally to this report.

[§] Midwest Analytics and Disease Modeling Center is a CDC Center for Forecasting and Outbreak Analytics–funded partnership among the University of Minnesota, the Minnesota Department of Health, and the Minnesota Electronic Health Records Consortium (a collaboration among the 11 largest health systems that collectively care for >90% of Minnesotans). https://www.sph.umn.edu/research/centers/midwest-analytics-and-disease-modeling/

FIGURE. Number of human parvovirus B19 immunoglobulin M and polymerase chain reaction tests performed and percentage of tests with positive results* among persons of all ages (A), among females aged 15–49 years (B), and percentage of positive results by age group (C) — Minnesota, January 2019–September 2024[†,§]



Abbreviation: Q = quarter.

* One-year moving average.

† Q1 = January–March; Q2 = April–June; Q3 = July–September; Q4 = October–December.

§ A total of 10 health systems reported human parvovirus B19 test results through the Minnesota Electronic Health Record Consortium during January 2019–September 2024. Two health systems had data through June 2024. The remaining eight health systems had data through August 31, 2024; however, data from September 2024 is incomplete.

Summary

What is already known about this topic?

Human parvovirus B19 (B19) infection during pregnancy can have serious consequences for the pregnancy and the fetus.

What is added by this report?

An increased frequency of B19 infections, including severe sequelae among pregnant women in Minnesota, was identified in 2024 through clinician reporting and evaluation of electronic health data.

What are the implications for public health practice?

Health care providers should have a high index of suspicion for B19 in pregnant persons, offer counseling, and provide appropriate monitoring and care.

Preliminary Conclusions and Actions

MDH alerted CDC and both agencies released health advisories (*3*,*4*). Health care providers should educate patients with suspected or confirmed B19 infection to inform exposed contacts who are pregnant and others at risk (such as those who are immunosuppressed or have chronic hemolytic blood disorders) and advise exposed contacts to consult with their health care providers. Obstetric providers should maintain a high index of suspicion for B19 and recommend testing (including serology and PCR) for pregnant persons with exposure to B19 or who have compatible signs and symptoms of maternal or fetal B19 disease, as clinically appropriate. Pregnant persons with B19 infection should be evaluated for fetal or pregnancy complications by an obstetric specialist (*5*). Public health officials should raise awareness about parvovirus B19 activity, including among child care and school providers, and provide information about who might be at higher risk for severe B19 disease and when infected children and staff members can return to child care or school after infection.

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Notes from the Field

Increase in Diagnoses of Human Parvovirus B19–Associated Aplastic Crises in Children and Adolescents with Sickle Cell Disease — Atlanta, Georgia, December 14, 2023–September 30, 2024

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Human parvovirus B19 (B19) is a common viral infection transmitted by respiratory droplets. Although B19 infection is typically mild in healthy persons, persons with sickle cell disease (SCD) can experience severe anemia from impairment of red blood cell production (*1*–*3*).

In December 2023, a child aged 10 years with SCD (child A) died unexpectedly at home, with no preceding fever or symptoms. Limited laboratory testing showed hematocrit <15% (normal = 37%–45%); testing for B19 was not performed. Massive splenomegaly was noted on autopsy, consistent with splenic sequestration crisis associated with SCD. Six days later, child A's sibling (child B), aged 14 years, who also has SCD, was confirmed to have acute B19 infection. Child B's laboratory evaluation showed hemoglobin <6 g/dL (normal = 12.0–16.0 g/dL) and reticulocyte count 7.0 × 10^9/L (normal = 40–102 × 10^9/L), consistent with aplastic crisis. Child B received a red blood cell transfusion and recovered without complications. Data from the Sickle Cell Clinical Database of Children's Healthcare of Atlanta (CHOA) were reviewed to describe recent trends in B19 infection among children with SCD. This study was approved by the Institutional Review Board of CHOA.

Investigations and Outcomes

At CHOA, patients with SCD are presumed to have aplastic crisis and are tested for B19 if laboratory evaluation shows a decrease in hemoglobin ≥1 g/dL from baseline with reticulocytopenia. Examination of data from CHOA's Sickle Cell Clinical Database identified 55 cases of B19 infection with aplastic crisis in children with SCD during December 2023–September 30, 2024 (two in 2023 [child B and another, unrelated child] and 53 in 2024). During January–September 2024, the incidence of B19 infection associated with aplastic crisis among all pediatric patients with SCD who had a clinical encounter at CHOA during that calendar year was 35.6 per 1,000 patient-years, 3.6 times higher than that during 2010–2023 (7.78 per 1,000 patient-years) (Figure). Increased numbers of B19-associated aplastic crisis cases and incidence occurred in 2014 (34 cases; 19.2 per 1,000 patient-years) and 2019 (30 cases; 14.7 per 1,000 patient-years). Based on clinical suspicion, during 2010–2023, a median of 2.9% of all patients with SCD with health care encounters at CHOA were tested for B19 per year (range = 1.4%–5.7%); in 2024, 6.8% of patients were tested (Supplementary Figure, https://stacks.cdc.gov/view/cdc/170361).

The median patient age at infection since December 2023 was 10.1 years, compared with 7.7 years during 2010–January 2023 (p = 0.004).* Common signs and symptoms included pain (78%), fever (62%), fatigue (31%), and respiratory symptoms (26%). The median decline in hemoglobin from baseline to nadir was 3.6 g/dL (IQR = 3.0–4.8). Complications included acute chest syndrome† (27%), splenic sequestration§ (11%), stroke (3.6%), and nephrotic syndrome (1.8%). Forty-three (78%) patients received red blood cell transfusions. Other than child A, in whom a diagnosis of B19 was not confirmed, no other patients died with B19 infection.

Preliminary Conclusions and Actions

During 2024, an increased incidence of B19-associated aplastic crisis was observed among patients with SCD at one pediatric health care system in Atlanta, compared with incidence during 2010–2023. Among SCD patients with B19 infection, the most common initial signs of infection include anemia and reticulocytopenia. Health care providers should be aware of the risk for complications of B19 infection in children with SCD and have a low threshold for testing when there is clinical suspicion of aplastic crisis. Children and adolescents with SCD and B19 infection should be monitored for complications; early red blood cell transfusion might prevent serious adverse outcomes.

* Wilcoxon rank-sum test.
† A vaso-occlusive complication in the pulmonary vasculature.
§ A sudden enlargement of the spleen caused by trapping of sickled red blood cells, resulting in reduction in blood volume and hemoglobin.

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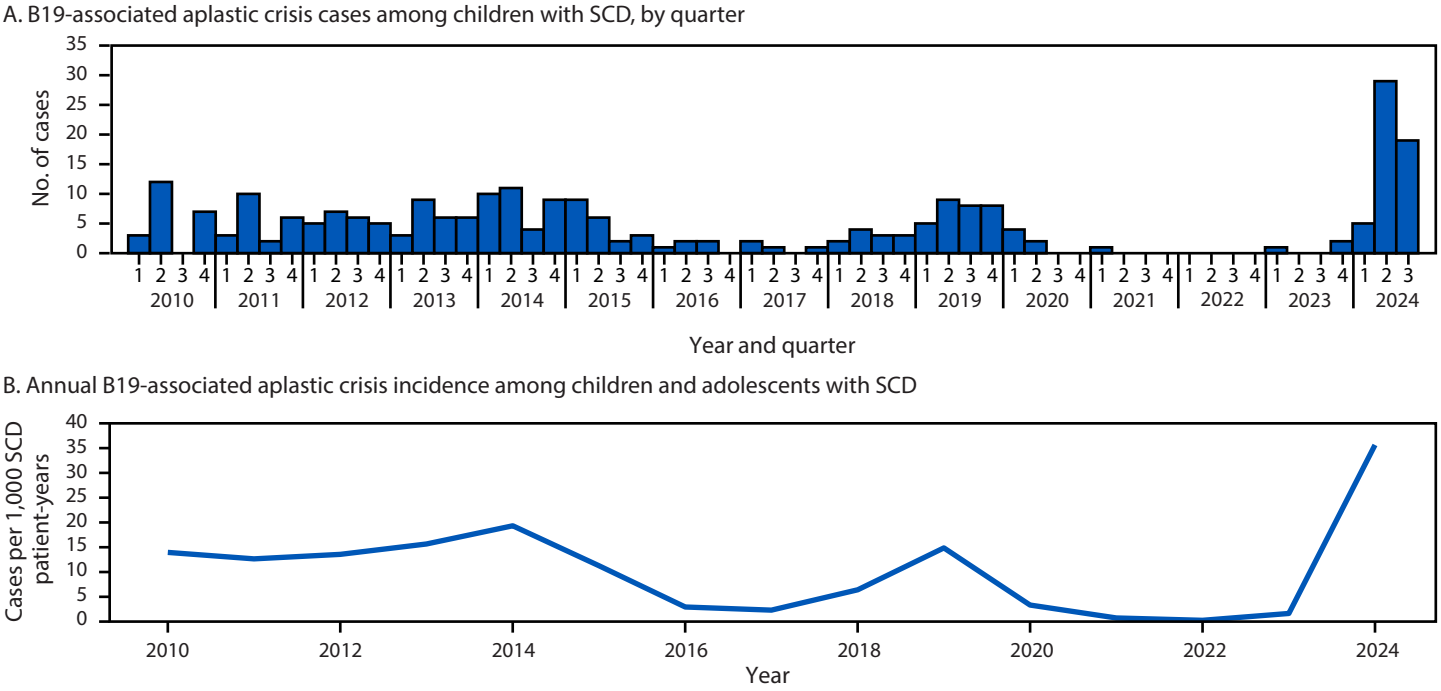
FIGURE. Human parvovirus B19–associated aplastic crisis cases (A) and incidence (B) identified among children and adolescents with sickle cell disease — Children's Healthcare of Atlanta, Atlanta, Georgia, January 1, 2010–September 30, 2024



Abbreviations: B19 = human parvovirus B19; SCD = sickle cell disease.

Summary

What is already known about this topic?

Human parvovirus B19 (B19) can cause transient aplastic crises in persons with chronic anemia, including sickle cell disease (SCD).

What is added by this report?

In a large SCD center in the southeastern United States, the incidence rate of B19-associated aplastic crisis was 3.6 times higher in the first 9 months of 2024 compared with the overall rate during 2010–2023.

What are the implications for public health practice?

Health care providers should be aware of increased B19 activity in 2024 and consider B19 infection in persons with SCD presenting with anemia and reticulocytopenia because this population might require urgent blood transfusion to reduce the risk for severe complications.

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