

## Characteristics of Children Aged <18 Years with Zika Virus Disease Acquired Postnatally — U.S. States, January 2015–July 2016

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Zika virus is an emerging mosquito-borne flavivirus that typically causes an asymptomatic infection or mild illness, although infection during pregnancy is a cause of microcephaly and other serious brain abnormalities. Guillain-Barré syndrome and other neurologic complications can occur in adults after Zika virus infection. However, there are few published reports describing postnatally acquired Zika virus disease among children. During January 2015–July 2016, a total of 158 cases of confirmed or probable postnatally acquired Zika virus disease among children aged <18 years were reported to CDC from U.S. states. The median age was 14 years (range = 1 month–17 years), and 88 (56%) were female. Two (1%) patients were hospitalized; none developed Guillain-Barré syndrome, and none died. All reported cases were travel-associated. Overall, 129 (82%) children had rash, 87 (55%) had fever, 45 (29%) had conjunctivitis, and 44 (28%) had arthralgia. Health care providers should consider a diagnosis of Zika virus disease in children who have an epidemiologic risk factor and clinically compatible illness, and should report cases to their state or local health department.

Zika virus is a flavivirus that is primarily transmitted by *Aedes aegypti* mosquitoes (1). Most infections are asymptomatic or cause mild illness characterized by signs and symptoms that can include acute fever, maculopapular rash, arthralgia, or nonpurulent conjunctivitis (2). Zika virus infection during pregnancy has been associated with fetal loss and is a cause of microcephaly or other brain abnormalities (3,4). Guillain-Barré syndrome (an autoimmune disorder of the peripheral nervous system), other neurologic manifestations, and thrombocytopenia have been reported following Zika virus infections in adults (5,6). However, there are few published data on the clinical findings and outcomes of postnatally acquired Zika virus disease among children (7). This case series describes the epidemiology, clinical findings, and outcomes in 158 U.S. children with confirmed or probable postnatally acquired Zika virus disease.

For this analysis, Zika virus disease was defined according to the Council of State and Territorial Epidemiologists' (CSTE) interim national surveillance case definitions.\* The analysis includes

confirmed or probable Zika virus disease cases among children aged <18 years with onset during January 1, 2015–July 31, 2016 and reported from U.S. states and the District of Columbia to ArboNET, CDC's national arboviral disease surveillance system,† as of September 9, 2016. Children living in Puerto Rico and other U.S. territories were not included in this report. Infants with congenital Zika virus infection were excluded.

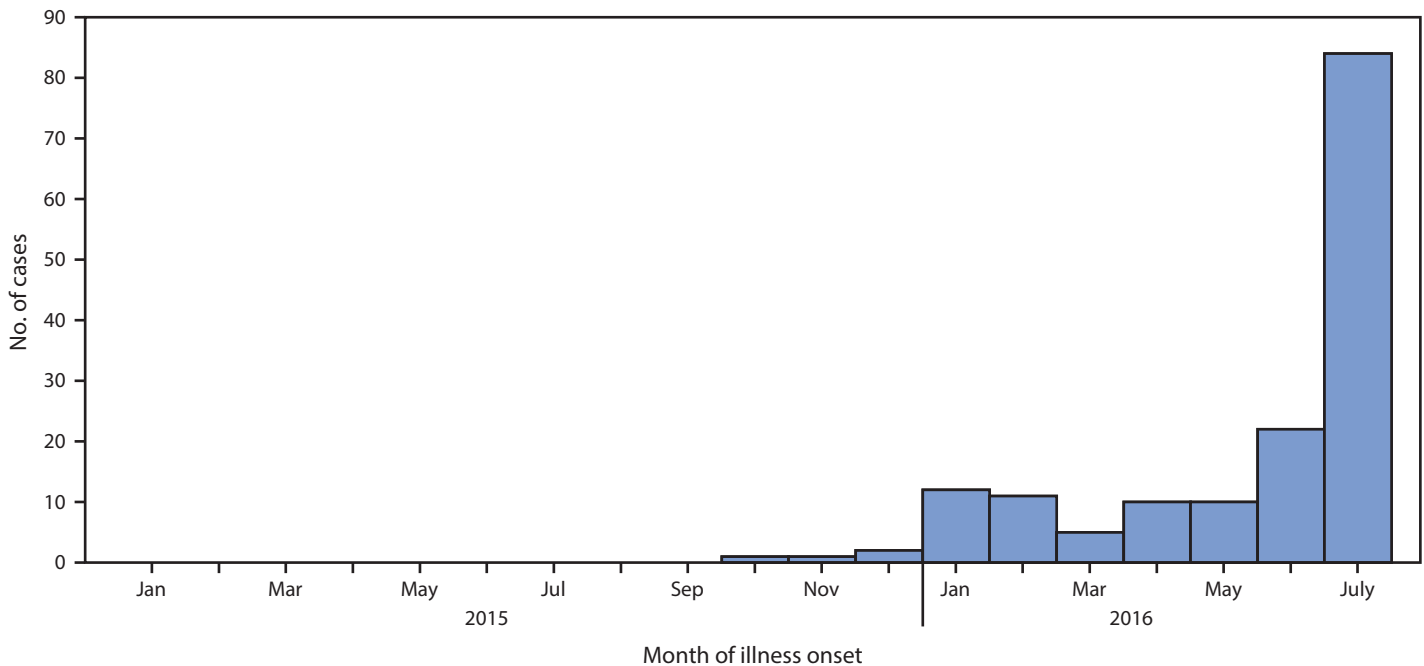
During the study period, 158 confirmed or probable pediatric cases of Zika virus disease were reported from 30 U.S. states. States with the highest numbers of reported cases were Florida (36 [23%]), New York (17 [11%]), and California (15 [9%]); 20 states and the District of Columbia reported no pediatric cases. The first patient reported in this series had onset of symptoms in October 2015; however, 103 (65%) cases occurred during June–July 2016 (Figure). The median patient age was 14 years (range = 1 month–17 years), and 88 (56%) patients were female (Table 1). Forty-two (49%) patients aged 0–14 years and 46 (63%) patients aged 15–17 years were female. Five (3%) patients were pregnant, all of whom were aged 16–17 years. No children were reported to have meningitis, encephalitis, or Guillain-Barré syndrome. Two (1%) children were hospitalized: one child, aged 4 years, was hospitalized for 3 days because of fever, cough, and poor oral intake, and a second child, aged 1 year, was hospitalized overnight for cough and rash. No children with Zika virus disease died. All pediatric patients acquired Zika virus infection during travel to a country or territory with documented local mosquito-borne transmission. The places most frequently visited were the Dominican Republic (39 patients [25%]), Puerto Rico (26 [16%]), Honduras (17 [11%]), Nicaragua (17 [11%]), and Jamaica (14 [9%]).

Of the four primary clinical signs and symptoms included in the case definition, 129 (82%) children had rash, 87 (55%) fever, 45 (29%) conjunctivitis, and 44 (28%) arthralgia (Table 2). Overall, 111 (70%) children had two or more of these four signs and symptoms, including 86 (54%) with both fever and rash; 53 (33%) had three or more of the primary signs or symptoms. There were no significant differences among age groups in the proportion of these four main clinical features reported. Other reported symptoms included headache,

\* [http://cymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16\\_ID\\_01\\_edited7.29.pdf](http://cymcdn.com/sites/www.cste.org/resource/resmgr/2016PS/16_ID_01_edited7.29.pdf).

† <http://www.cdc.gov/westnile/resources/pdfs/wnvguidelines.pdf>.

**FIGURE.** Number of cases of confirmed or probable postnatally acquired Zika virus disease (N = 158) in children aged <18 years, by month of illness onset — U.S. states, January 2015–July 2016



myalgia, vomiting, diarrhea, retro-orbital pain, chills, and sore throat; however, information on each of these symptoms was missing for a large proportion of children.

### Discussion

This series of 158 children with postnatally acquired Zika virus disease corroborates previously published reports suggesting that the clinical course of Zika virus disease is typically mild in children, as it is in adults (2,7). In this case series, only two children were hospitalized, and no deaths occurred. Serious complications of Zika virus disease, such as Guillain-Barré syndrome, were not reported for any children in this analysis. However, health care providers should be aware of potential serious consequences of Zika virus disease, including neurologic manifestations, and should notify state health departments of all Zika virus disease cases.

Severe disease following Zika virus infection in children has rarely been reported. Two deaths possibly associated with postnatally acquired Zika virus disease have been reported among children, including a Brazilian girl aged 16 years with possible hemorrhage and a Colombian girl aged 15 years with sickle cell disease who developed severe acute respiratory distress syndrome, hemothorax, and splenic sequestration.<sup>§,¶</sup>

<sup>§</sup> [http://www.paho.org/hq/index.php?option=com\\_docman&task=doc\\_download&Itemid=&gid=32405%E2%9F%A8=en](http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&Itemid=&gid=32405%E2%9F%A8=en).

<sup>¶</sup> <http://portalsaude.saude.gov.br/images/pdf/2015/novembro/30/COES-Microcefalias---Informe-Epidemiol--gico---SE-47---30nov2015.pdf>.

Guillain-Barré syndrome and meningoencephalitis also have been reported rarely among children during the recent outbreak in Brazil.\*\* No deaths or neurologic complications following Zika virus infection in children were reported after outbreaks in Yap State, Micronesia, or French Polynesia (2,5). Further evaluation is needed to determine the incidence of severe disease manifestations, risk factors for more severe illness, and long-term outcomes of postnatally acquired Zika virus infection in children.

Almost half of the pediatric patients with Zika virus disease in this series were aged 15–17 years, with a slight female preponderance. The relatively higher proportion of cases in females and older children might be related to health care-seeking or testing bias (e.g., girls who are or might become pregnant might be more likely to seek care or to be tested) or older children being more likely to travel and thus to be exposed to Zika virus. In addition, clinicians might be less likely to suspect Zika virus infection in younger children, because the signs and symptoms (rash and fever) are nonspecific and similar to those associated with other childhood rash illnesses (e.g., roseola or scarlet fever) or drug reactions.

Compared with symptoms reported for 10 children in previously published case reports or series of Zika virus disease (7), the proportion of children in this report with rash was higher and the proportion with fever and gastrointestinal

\*\* <http://portalsaude.saude.gov.br/images/pdf/2015/dezembro/09/Microcefalia---Protocolo-de-vigil--ncia-e-resposta---vers--o-1---09dez2015-8h.pdf>.

**TABLE 1. Characteristics of children aged <18 years with confirmed or probable postnatally acquired Zika virus disease (N = 158) — U.S. states, January 2015–July 2016**

Characteristic	No.	(%)
<b>Age group (yrs)</b>		
0–4	16	(10)
5–9	29	(19)
10–14	40	(25)
15–17	73	(46)
<b>Sex</b>		
Male	70	(44)
Female	88	(56)
<b>Pregnant females</b>	5	(3)
<b>Clinical outcome</b>		
Hospitalized	2	(1)
Guillain-Barré syndrome	0	—
Died	0	—

**TABLE 2. Clinical signs and symptoms in children aged <18 years with confirmed or probable postnatally acquired Zika virus disease (N = 158) — U.S. states, January 2015–July 2016**

Sign/Symptom*	Yes		No		Unknown	
	No.	(%)	No.	(%)	No.	(%)
Rash	129	(82)	2	(1)	27	(17)
Fever	87	(55)	35	(22)	36	(23)
Conjunctivitis	45	(29)	35	(22)	78	(49)
Arthralgia	44	(28)	33	(21)	81	(51)

\* Some patients had multiple signs, multiple symptoms, or both signs and symptoms.

symptoms was lower. However, this report is population-based and patients met a standard case definition, including clinical, epidemiologic, and laboratory criteria. In contrast, previous reports often identified cases among hospitalized children with febrile illness, the laboratory evidence of Zika virus infection was not always definitive, and some children had evidence of other infections (e.g., malaria and dengue) (7). Published reports with aggregate information on symptoms among adults and children with laboratory-confirmed Zika virus disease during a 2007 outbreak in Yap and among adults and children with suspected Zika virus disease during a 2015–2016 outbreak in Colombia found similar overall frequencies of fever and rash as those described in this report (2,8). However, higher frequencies of conjunctivitis and arthralgia were described in those reports than in this series, possibly because such symptoms are more commonly identified in adults than children with Zika virus disease, or as a result of the inclusion of patients without laboratory-confirmed Zika virus disease in the Colombia report.

No antiviral medications are available to treat Zika virus infection, but symptomatic treatment with antipyretics and supportive care are appropriate and usually sufficient. Aspirin should never be used to treat symptoms of acute viral illnesses in children because

## Summary

### What is already known about this topic?

Zika virus disease, a mosquito-borne infection, usually causes asymptomatic or mild illness, although congenital infection can result in brain abnormalities, and neurologic manifestations have occurred rarely following infection in adults. However, there are few published reports of postnatally acquired Zika virus disease among children.

### What is added by this report?

During January 2015–July 2016, a total of 158 travel-associated confirmed or probable cases of postnatally acquired Zika virus disease among children aged <18 years were reported to CDC from U.S. states. The median age of the patients was 14 years, 88 (56%) were female, and five (3%) were pregnant. Most children with Zika virus disease had rash, and more than half had fever and rash. Two (1%) patients were hospitalized; none had Guillain-Barré syndrome, and none died.

### What are the implications for public health practice?

Health care providers should consider a diagnosis of Zika virus disease in children who have an epidemiologic risk factor and clinically compatible illness and should counsel sexually active adolescents regarding the risk for congenital Zika virus infection and prevention of unintended pregnancies. Although Zika virus disease in children is typically mild, health care providers should be aware of the possibility of serious complications, such as neurologic manifestations, and should report all cases of Zika virus disease to their state or local health department.

of the risk for Reye syndrome. All nonsteroidal anti-inflammatory drugs (NSAIDs) should be avoided in children aged <6 months. NSAIDs also should be avoided in all other age groups until infection with dengue virus is ruled out, to avoid the potential for hemorrhagic complications of dengue fever (7).

Protecting children from mosquito bites is the best way to prevent Zika virus infection in children. However, among sexually active adolescents, there also is a risk for sexual transmission of Zika virus; either mosquito-borne transmission or sexual transmission during pregnancy could result in congenital infection. Five of the travel-associated Zika virus disease cases in this report occurred in adolescents aged 16–17 years who were pregnant, underscoring the importance of ensuring that sexually active adolescents receive guidance for preventing sexual transmission of Zika virus and have access to and counseling on contraception. Pregnant adolescents with possible Zika virus infection should be properly evaluated according to published guidance (9,10).

The findings in this report are subject to at least three limitations. First, this series represents only symptomatic cases reported to CDC that met the national confirmed or probable case definition; there likely are other cases of pediatric Zika virus disease that are not reported because the patients did not seek care or were not tested for evidence of recent Zika

virus disease and did not receive a diagnosis. Second, there is potential for testing bias; testing of pregnant women and women of childbearing age has been prioritized (10), likely resulting in a disproportionate number of pediatric cases being identified among pregnant adolescents. Third, signs and symptoms of Zika virus infection are optionally reported to ArboNET, often with missing data, which might affect their representativeness; additionally, potential findings such as longer-term neurologic complications are not systematically reported to ArboNET. Nonetheless, this analysis includes the largest series of laboratory-confirmed cases of Zika virus disease among children reported to date.

The symptoms most frequently reported among children with Zika virus disease are common to many childhood illnesses. Health care providers should consider Zika virus disease in the differential diagnosis for children with the acute onset of fever, rash, arthralgia, or conjunctivitis, who reside in or have a history of travel to an area where active Zika virus transmission is occurring, or who have another epidemiologic risk factor for Zika virus disease. Children with suspected Zika virus disease should have blood and urine specimens collected and tested per current guidelines.<sup>††</sup> Although Zika virus disease appears to be a mild illness in children, health care providers should report suspected cases to their state or local health department to facilitate diagnosis and mitigate the risk for local transmission. Providers should counsel sexually active adolescents who might be exposed to Zika virus regarding the risk for congenital Zika virus infection and prevention of unintended pregnancies. Guidance for health care providers caring for infants and children with possible postnatally acquired Zika virus disease is available online (<http://www.cdc.gov/zika/hc-providers/infants-children.html>).

<sup>††</sup> <http://www.cdc.gov/zika/laboratories/lab-guidance.html>.

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