Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 65 / No. 17
May 6, 2016

Healthy Vision Month — May 2016

May is Healthy Vision Month, a national observance devoted to encouraging persons to make vision and eye health a priority. During this month, CDC's Vision Health Initiative in the Division of Diabetes Translation partners with the National Eye Institute's National Eye Health Education Program to educate the public about vision loss prevention and eye health promotion. May is also Older Americans Month, which offers an opportunity to raise awareness about the importance of older adults' health and well-being to their independence.

In recognition of these two observances, CDC's Vision Health Initiative recently examined the state-specific annual prevalence of falls among persons aged ≥65 years with and without self-reported severe vision impairment. The study's findings, reported in this issue, indicate a higher prevalence of falls among older adults with severe vision impairment, as well as wide variation in that prevalence among states. These findings suggest that among the approximately 2.8 million persons aged ≥65 years reporting severe vision impairment in 2014 (*1*), an estimated 1.3 million likely experienced a fall in the previous year. The findings also underscore the importance of each state implementing effective strategies to improve vision health and reduce falls, especially among older adults with severe vision impairment.

Because many common eye diseases have no immediate symptoms, early detection and timely treatment are important, as is the use of proper eye-safety practices. Developing community-based interventions for populations at high risk might reduce identified disparities in vision health. More information about vision and eye health is available from CDC (http://www.cdc.gov/visionhealth) and the National Eye Institute (https://nei.nih.gov/hvm).

Reference

1. Census Bureau. Disability characteristics. Suitland, MD: US Department of Commerce, Census Bureau; 2016. http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_S1810&prodType=table

Falls Among Persons Aged ≥65 Years With and Without Severe Vision Impairment — United States, 2014

John E. Crews, DPA[1]; Chiu-Fung Chou, DrPH[1]; Judy A. Stevens, PhD[2]; Jinan B. Saaddine, MD[1]

In 2014, an estimated 2.8 million persons aged ≥65 years in the United States reported severe vision impairment* defined as being blind or having severe difficulty seeing, even with eyeglasses. Good vision is important for maintaining balance as well as for identifying low-contrast hazards, estimating distances, and discerning spatial relationships. Conversely, having poor vision increases the risk for falls (*1*,*2*). Falls among older adults are common and can cause serious injuries, disabilities, and premature death (*1*,*3*). To date, no state-level investigations have examined the annual prevalence of falls

*http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_S1810&prodType=table.

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

among persons with and without severe vision impairment. CDC analyzed data from the 2014 Behavioral Risk Factor Surveillance System (BRFSS) to estimate the state-specific annual prevalence of falls among persons aged ≥65 years with and without self-reported severe vision impairment. Overall, 46.7% of persons with, and 27.7% of older adults without, self-reported severe vision impairment reported having fallen during the previous year. The state-specific annual prevalence of falls among persons aged ≥65 years with severe vision impairment ranged from 30.8% (Hawaii) to 59.1% (California). In contrast, the prevalence of falls among persons aged ≥65 years without severe vision impairment ranged from 20.4% (Hawaii) to 32.4% (Alaska). Developing fall-prevention interventions intended for persons with severe vision impairment will help states manage the impact of vision impairment and falls on health care resources, and can inform state-specific fall prevention initiatives.

The BRFSS is a state-based, cross-sectional, telephone surveillance system that examines health-related behavioral risk factors among the U.S. civilian population aged ≥18 years.[†] It is administered by states and territories in collaboration with CDC. The median response rate in 2014 was 47.8%; the median completion rate was 47.0%.

[†] http://www.cdc.gov/brfss.

The 2014 BRFSS included questions about severe vision impairment[§] and about falls.[¶] Persons who responded "don't know" or "refused" to either question were excluded from the analyses. The study sample included 140,762 adults aged ≥65 years from 50 states and the District of Columbia (DC). SUDAAN statistical software version 9.3 was used for the analyses to account for the complex sampling design. Estimates were age-adjusted and weighted to account for individual selection probabilities, nonresponse, and poststratification. State and national populations and prevalences were estimated. Statistically significant differences ($p<0.05$) were determined by a chi-square test.

Overall, 6.7% of respondents reported severe vision impairment. Among all respondents, 28.9% reported at least one fall in the previous year (Table). Among respondents who reported severe vision impairment, 46.7% reported a fall during the previous year, ranging from 30.8% in Hawaii to 59.1% in California ($p<0.001$). Among persons who did not report vision impairment, 27.7% reported a fall during the previous year, ranging from 20.4% in Hawaii to 32.4% in Alaska ($p<0.001$). In 30 states, 40%–49% of persons with vision impairment fell,

[§] The BRFSS vision question is, "Are you blind or do you have serious difficulty seeing, even when wearing glasses?" Severe vision impairment was defined as a positive response to this question.

[¶] In even-numbered years, the BRFSS core survey contains the question, "In the past 12 months, how many times have you fallen?" and defines a fall as "when a person unintentionally comes to rest on the ground or another lower level." Respondents were dichotomized into either those in the last year who did or those who did not fall.

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

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2016;65:[inclusive page numbers].

TABLE. Age-adjusted prevalence* of falls among persons aged ≥65 years, by self-reported vision impairment† status and state — United States, 2014

State	Vision impairment		No vision impairment		Total	
	No.§	% (95% CI)	No.§	% (95%CI)	No.§	% 95% CI
Alabama	24,184	43.4 (36.4–50.7)	178,857	28.7 (26.5–31.1)	203,040	29.8 (27.7–32.1)
Alaska¶	1,781	45.3 (30.3–61.3)	20,304	32.4 (28.0–37.1)	22,085	33.2 (29.0–37.6)
Arizona	24,352	39.2 (32.3–46.6)	226,772	26.8 (25.2–28.4)	251,124	27.7 (26.1–29.3)
Arkansas	20,301	58.7 (48.7–68.1)	121,766	32.1 (29.4–35.0)	142,068	34.4 (31.7–37.2)
California	169,407	59.1 (47.6–69.8)	983,556	28.4 (25.7–31.3)	1,152,963	30.9 (28.1–33.8)
Colorado	12,119	37.4 (28.8–46.9)	148,836	26.6 (24.8–28.4)	160,955	27.3 (25.6–29.1)
Connecticut	13,647	47.0 (35.4–59.0)	121,889	25.6 (23.2–28.1)	135,536	26.8 (24.4–29.2)
Delaware¶	2,614	37.3 (23.3–53.8)	36,776	28.1 (25.2–31.2)	39,390	28.4 (25.6–31.4)
District of Columbia	2,829	51.0 (36.0–65.7)	18,464	29.3 (26.0–32.8)	21,293	31.0 (27.8–34.5)
Florida	74,318	35.2 (27.6–43.5)	779,171	24.8 (23.0–26.6)	853,489	25.4 (23.7–27.3)
Georgia	43,124	48.0 (38.1–58.1)	279,281	27.4 (24.9–30.1)	322,406	29.1 (26.6–31.7)
Hawaii¶	2,530	30.8 (19.1–45.7)	40,476	20.4 (18.0–23.1)	43,005	20.9 (18.5–23.5)
Idaho¶	5,840	37.5 (25.7–51.1)	57,583	29.4 (26.6–32.4)	63,423	30.0 (27.2–32.9)
Illinois	46,609	54.9 (38.7–70.1)	411,836	26.0 (23.4–28.9)	458,444	27.5 (24.7–30.5)
Indiana	25,963	51.5 (43.7–59.2)	243,856	30.4 (28.5–32.4)	269,819	31.7 (29.8–33.6)
Iowa	9,297	46.8 (35.8–58.2)	132,301	30.8 (28.7–33.0)	141,598	31.5 (29.4–33.7)
Kansas	11,907	46.1 (39.0–53.4)	103,525	29.3 (27.7–31.0)	115,432	30.3 (28.8–31.9)
Kentucky	26,934	46.3 (35.9–57.0)	164,501	30.9 (28.4–33.5)	191,435	32.4 (29.9–35.0)
Louisiana	23,897	40.9 (33.0–49.4)	122,972	23.5 (21.2–25.9)	146,870	25.2 (23.0–27.6)
Maine	4,069	51.3 (40.2–62.3)	63,338	29.6 (27.6–31.7)	67,407	30.3 (28.3–32.4)
Maryland	10,515	35.6 (26.9–45.4)	180,676	25.1 (22.9–27.3)	191,191	25.4 (23.3–27.7)
Massachusetts	30,674	47.7 (38.3–57.3)	232,550	27.3 (25.4–29.2)	263,224	28.6 (26.8–30.6)
Michigan	48,140	53.4 (43.2–63.3)	418,074	31.1 (29.0–33.4)	466,214	32.5 (30.4–34.7)
Minnesota	16,267	43.4 (34.9–52.3)	173,790	25.7 (24.1–27.3)	190,057	26.5 (25.0–28.2)
Mississippi	13,609	42.2 (31.4–53.8)	95,772	26.3 (23.4–29.4)	109,381	27.6 (24.8–30.6)
Missouri	23,583	44.8 (34.5–55.5)	253,825	32.0 (29.4–34.7)	277,408	32.8 (30.2–35.4)
Montana	4,640	44.2 (34.9–54.0)	46,622	31.5 (29.0–34.2)	51,262	32.3 (29.9–34.9)
Nebraska	5,936	42.1 (34.5–50.1)	65,575	27.3 (25.9–28.8)	71,510	28.1 (26.7–29.6)
Nevada	14,246	44.5 (31.7–58.1)	85,860	26.1 (22.6–29.9)	100,106	27.7 (24.3–31.4)
New Hampshire	4,642	45.8 (31.6–60.7)	49,598	27.1 (24.5–29.8)	54,240	28.0 (25.5–30.7)
New Jersey	30,544	41.8 (32.4–51.8)	254,566	22.7 (20.7–24.9)	285,110	23.9 (21.9–26.0)
New Mexico	9,998	50.5 (40.8–60.1)	67,539	26.3 (23.9–28.7)	77,537	28.0 (25.7–30.4)
New York	70,967	39.9 (28.4–52.5)	656,123	26.9 (24.3–29.7)	727,090	27.7 (25.2–30.4)
North Carolina	42,971	40.2 (32.2–48.8)	338,647	27.5 (25.3–29.9)	381,617	28.5 (26.4–30.8)
North Dakota	2,560	44.9 (32.8–57.8)	24,813	26.1 (23.6–28.7)	27,373	27.2 (24.8–29.7)
Ohio	57,032	51.7 (41.4–61.7)	441,646	28.4 (26.2–30.7)	498,678	29.8 (27.7–32.1)
Oklahoma	16,450	44.5 (36.3–53.0)	142,903	29.7 (27.7–31.9)	159,353	30.8 (28.8–32.8)
Oregon	15,716	54.5 (42.9–65.7)	167,689	30.6 (28.1–33.2)	183,406	31.8 (29.4–34.4)
Pennsylvania	46,270	48.4 (39.6–57.3)	518,933	27.7 (25.8–29.8)	565,204	28.8 (26.8–30.8)
Rhode Island	3,664	44.5 (33.7–55.8)	37,037	25.7 (23.3–28.4)	40,701	26.7 (24.3–29.3)
South Carolina	26,792	47.9 (40.7–55.3)	181,227	28.2 (26.3–30.2)	208,020	29.8 (27.9–31.7)
South Dakota	5,302	57.0 (44.8–68.4)	29,074	26.1 (23.2–29.3)	34,376	28.3 (25.4–31.5)
Tennessee	37,676	49.1 (39.4–58.9)	231,815	29.6 (26.8–32.5)	269,491	31.1 (28.4–33.9)
Texas	114,897	49.1 (40.0–58.3)	742,627	30.0 (27.5–32.6)	857,524	31.5 (29.1–34.1)
Utah	8,954	52.6 (43.4–61.6)	72,355	28.4 (26.5–30.4)	81,308	29.9 (28.0–31.9)
Vermont¶	2,008	43.5 (30.7–57.3)	28,925	31.6 (28.9–34.3)	30,933	32.2 (29.6–34.9)
Virginia	30,020	42.9 (33.2–53.3)	248,024	24.7 (22.6–27.1)	278,044	25.9 (23.7–28.1)
Washington	26,753	46.4 (37.6–55.4)	255,718	29.8 (27.8–31.9)	282,470	30.9 (28.9–32.9)
West Virginia	12,740	34.1 (27.4–41.6)	70,809	25.9 (23.6–28.4)	83,548	26.9 (24.7–29.3)
Wisconsin¶	8,396	39.4 (25.6–55.2)	181,745	27.5 (24.5–30.7)	190,142	27.7 (24.8–30.9)
Wyoming	2,373	44.0 (35.4–53.0)	21,584	31.3 (28.8–34.0)	23,957	32.3 (29.9–34.9)
Total	**1,290,055**	**46.7 (44.5–49.0)**	**10,572,200**	**27.7 (27.2–28.1)**	**11,864,255**	**28.9 (28.4–29.4)**

Abbreviation: CI = confidence interval.

* Weighted estimates, age adjusted to the 2000 U.S. standard population.

† Respondents were asked, "Are you blind or do you have serious difficulty seeing, even when wearing glasses?"; "In the past 12 months, how many times have you fallen?" Respondents who refused to answer, reported "don't know," or who had other missing responses were excluded from the analyses.

§ Weighted numbers.

¶ States without significant difference in falls between those with vision impairment and no vision impairment.

and in 11 states and DC, approximately half of older adults with severe vision impairment fell. Extrapolating these findings to the U.S. population in 2014, an estimated 1.3 million persons ≥65 years with severe vision impairment fell in the previous year.

Discussion

Approximately 2.8 million older adults have severe vision impairment,** a condition associated with chronic diseases, depression, and social isolation (*4*). During 2014, vision problems were estimated to cost $145 billion annually (*5*). Vision impairment is associated with falls, which occur frequently among older adults and often cause long-term disabilities (*2*). In 2013, the direct medical costs of falls among persons aged ≥65 years were $34 billion (*6*).

In this assessment, 46.7% of adults aged ≥65 years with severe vision impairment fell, compared with 27.7% of those without severe vision impairment. The differences were statistically significant in all but six U.S. states (Alaska, Delaware, Hawaii, Idaho, Vermont, and Wisconsin). In 11 states and DC, approximately half of older adults with severe vision impairment fell. In 2014, an estimated 1.3 million persons aged ≥65 years with severe vision impairment fell in the previous year.

These findings are consistent with those from previous investigations that found an association between vision impairment and falls (*2*). Factors associated with falls include contrast sensitivity and poor balance, as well as poor visual acuity (*2*). Additional reasons include multiple chronic conditions, gait problems, lower extremity muscle weakness, and the use of multiple medications, some of which might exacerbate these problems (*7*). Addressing these risk factors would require a range of interventions, including education, medical risk management, exercise, and home modifications (*7*), as well as improved access to and use of eye care. Evidence-based interventions to prevent falls among older persons have been identified (http://www.cdc.gov/homeandrecreationalsafety/falls/community_preventfalls.html). In the only randomized controlled trial to date that evaluates fall-prevention interventions among older adults with vision impairment, investigators reported that, of the two interventions examined, a home safety intervention (e.g., increasing illumination, removing throw rugs, etc.), but not a strength and balance training program, significantly reduced falls among persons with vision impairment aged ≥75 years in New Zealand (*8*).

A number of evidence-based fall interventions address environmental hazards using occupational therapists (http://www.cdc.gov/homeandrecreationalsafety/falls/compendium.html), but these interventions are not designed for persons with vision impairment. Given the variety of visual factors associated with falls (visual acuity, visual fields, and contrast sensitivity) as well as visual barriers in educational materials (print size, poor contrast, and visual clutter) (*9*), randomized controlled trials of fall-prevention interventions intended for persons with severe vision impairment are needed (*10*).

The findings in this report are subject to at least five limitations. First, BRFSS data are self-reported and the accuracy of responses might be affected by recall, social desirability, or other factors. Second, these data are cross-sectional and do not permit causal inference. Third, although these estimates are age-adjusted, they do not account for differences such as health behaviors or chronic conditions that might be associated with vision impairment and also contribute to falls. Fourth, the median response rate was low (<50%). Finally, all of the excess falls among persons with severe vision impairments might not be caused by vision impairments.

Many state health departments are committed to reducing falls among older adults. The prevalence of falls among adults aged ≥65 years with severe vision impairment varies widely among states. However, the consistently high prevalence of falls among older persons with severe vision impairment suggests the need for all states to implement evidence-based fall reduction interventions specifically targeted to the needs of persons with severe vision impairment as well as to improve methods to prevent vision impairment. This approach might lead to fewer injuries, higher quality of life, and greater independence among older adults, as well as reduced health care costs.

Summary

What is already known about this topic?

Vision impairment is associated with falls among persons aged ≥65 years. Limited state-level data exists on the prevalence of falls among older persons with vision impairment.

What is added by this report?

A state-based, cross-sectional, telephone survey of noninstitutionalized U.S. adults aged ≥65 years found that 28.9% of respondents reported at least one fall in the previous year. Among the 6.7% of respondents who reported severe vision impairment, 46.7% reported a fall, ranging from 30.8% in Hawaii to 59.1% in California.

What are the implications for public health practice?

It is important to develop fall prevention interventions intended for persons with severe vision impairment and for each state to identify and implement effective strategies both to reduce falls and improve vision, especially among those with severe vision impairment.

** http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_S1810&prodType=table.

[1]Vision Health Initiative, Division of Diabetes translation, National Center for Chronic Disease Prevention and Health Promotion, CDC; [2]National Center for Injury Prevention and Control, CDC.

Corresponding author: John E. Crews, JCrews@cdc.gov, 770-488-1116.

References

1. Herndon JG, Helmick CG, Sattin RW, Stevens JA, DeVito C, Wingo PA. Chronic medical conditions and risk of fall injury events at home in older adults. J Am Geriatr Soc 1997;45:739–43. http://dx.doi.org/10.1111/j.1532-5415.1997.tb01480.x
2. Lord SR, Smith ST, Menant JC. Vision and falls in older people: risk factors and intervention strategies. Clin Geriatr Med 2010;26:569–81. http://dx.doi.org/10.1016/j.cger.2010.06.002
3. Morrison A, Fan T, Sen SS, Weisenfluh L. Epidemiology of falls and osteoporotic fractures: a systematic review. Clinicoecon Outcomes Res 2013;5:9–18.
4. Reed-Jones RJ, Solis GR, Lawson KA, Loya AM, Cude-Islas D, Berger CS. Vision and falls: a multidisciplinary review of the contributions of visual impairment to falls among older adults. Maturitas 2013;75:22–8. http://dx.doi.org/10.1016/j.maturitas.2013.01.019
5. Wittenborn J. The future of vision: forecasting the prevalence and cost of vision problems. In: Prevent Blindness 2014. Chicago, IL: NORC at the University of Chicago; 2014.
6. Stevens JA, Corso PS, Finkelstein EA, Miller TR. The costs of fatal and non-fatal falls among older adults. Inj Prev 2006;12:290–5. http://dx.doi.org/10.1136/ip.2005.011015
7. Steinman BA, Nguyen AQ, Pynoos J, Leland NE. Falls-prevention interventions for persons who are blind or visually impaired. Insight: Res Pract Vision Impairment Blindness 2011;4:83–91.
8. Campbell AJ, Robertson MC, La Grow SJ, et al. Randomised controlled trial of prevention of falls in people aged > or =75 with severe visual impairment: the VIP trial. BMJ 2005;331:817. http://dx.doi.org/10.1136/bmj.38601.447731.55
9. Williams AS. Making diabetes education accessible for people with visual impairment. Diabetes Educ 2009;35:612–21. http://dx.doi.org/10.1177/0145721709335005
10. Tricco AC, Cogo E, Holroyd-Leduc J, et al. Efficacy of falls prevention interventions: protocol for a systematic review and network meta-analysis. Syst Rev 2013;2:38. http://dx.doi.org/10.1186/2046-4053-2-38

Global Measles and Rubella Laboratory Network Support for Elimination Goals, 2010–2015

Mick N. Mulders, PhD[1]; Paul A. Rota, PhD[2]; Joseph P. Icenogle, PhD[2]; Kevin E. Brown, MD[3]; Makoto Takeda, MD, PhD[4]; Gloria J. Rey, MSc[5]; Myriam C. Ben Mamou, MD[6]; Annick R.G.A. Dosseh, PhD[7]; Charles R. Byabamazima, MD[8]; Hinda J. Ahmed, PhD[9]; Sirima Pattamadilok, MSc[10]; Yan Zhang, MD[11]; Marta Gacic-Dobo, MSc[1]; Peter M. Strebel, MBChB[1]; James L. Goodson, MPH[12]

In 2012, the World Health Assembly endorsed the Global Vaccine Action Plan (GVAP)* with the objective to eliminate measles and rubella in five World Health Organization (WHO) regions by 2020. In September 2013, countries in all six WHO regions had established measles elimination goals, and additional goals for elimination of rubella and congenital rubella syndrome were established in three regions (*1*). Capacity for surveillance, including laboratory confirmation, is fundamental to monitoring and verifying elimination. The 2012–2020 Global Measles and Rubella Strategic Plan of the Measles and Rubella Initiative† calls for effective case-based surveillance with laboratory testing for case confirmation (*2*). In 2000, the WHO Global Measles and Rubella Laboratory Network (GMRLN) was established to provide high quality laboratory support for surveillance (*3*). The GMRLN is the largest globally coordinated laboratory network, with 703 laboratories supporting surveillance in 191 countries. During 2010–2015, 742,187 serum specimens were tested, and 27,832 viral sequences were reported globally. Expansion of the capacity of the GMRLN will support measles and rubella elimination efforts as well as surveillance for other vaccine-preventable diseases (VPDs), including rotavirus, and for emerging pathogens of public health concern.

GMRLN Structure, Coordination, and Responsibilities

The GMRLN has a multitiered structure based on the design of the WHO Global Polio Laboratory Network.§ In 2015, measles surveillance in 191¶ countries was supported by 703 GMRLN laboratories based in 165 countries, including 506 subnational, 180 national, 14 regional reference, and three global specialized laboratories, with some laboratories having more than one designation. GMRLN is led by a global coordinator at WHO headquarters, and each region has at least one regional laboratory coordinator. The national and subnational laboratories perform the first-line laboratory testing required for case confirmation and are closely linked with the national immunization programs. Regional reference laboratories support national laboratories by providing confirmatory testing, proficiency testing, training, and support for genetic characterization of circulating wild-type viruses. The global specialized laboratories contribute to the standardization of procedures and protocols, the development and validation of novel methods, and the provision of crucial reagents, supplies, and training.

GMRLN laboratories play a critical role in the process of verification of elimination, which relies on high quality case-based surveillance. Laboratory performance indicators monitored by WHO include 1) the rate of discarded non-measles/nonrubella cases** at the national level (target ≥2 per 100,000 population), 2) the proportion of suspected cases with a serum sample obtained for laboratory confirmation, 3) the proportion of laboratory-confirmed chains of transmission with an adequate sample obtained for virus detection (i.e., adequacy of virologic surveillance), and 4) the proportion of serologic results reported within 4 days of specimen receipt in the laboratory (*4*).

Laboratory Testing

The annual number of measles cases identified from case-based and aggregate surveillance systems†† are reported by countries§§ to WHO and UNICEF through the Joint Reporting Form (JRF). Genotype data are reported to the WHO Measles Nucleotide Surveillance (MeaNS) and Rubella Nucleotide Surveillance (RubeNS) databases (*5*). According to JRF data, the number of specimens tested annually for measles immunoglobulin M (IgM) increased 51% during 2010–2014,

* The Global Vaccine Action Plan is the implementation plan of the Decade of Vaccines, a collaboration between WHO, UNICEF, the Bill and Melinda Gates Foundation, Gavi, the Vaccine Alliance, the U.S. National Institute of Allergy and Infectious Diseases, the African Leaders Malaria Alliance, and others, to extend the full benefit of immunization to all persons by 2020 and beyond. http://www.who.int/immunization/global_vaccine_action_plan/en. http://apps.who.int/gb/ebwha/pdf_files/wha65/a65_22-en.pdf.

† The Measles and Rubella Initiative is a partnership established in 2001 as the Measles Initiative, led by the American Red Cross, CDC, the United Nations Foundation, UNICEF, and WHO. http://measlesrubellainitiative.org/.

§ http://www.polioeradication.org/Dataandmonitoring/Surveillance/GlobalPolioLaboratoryNetwork.aspx.

¶ Countries without access to standardized quality-controlled testing by the WHO Measles and Rubella Laboratory Network in 2015 were Cape Verde, Sao Tome and Principe, and Seychelles.

** A suspected case that was investigated and discarded, either through negative results of adequate laboratory testing for measles or rubella or by an epidemiological link to a laboratory-confirmed case of another disease.

†† http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html.

§§ Countries without case-based measles surveillance in 2015 were Djibouti, India, Mauritius, Sao Tome and Principe, Seychelles, and Somalia.

from 171,170 to 258,339. According to monthly reported case-based surveillance data, the number of serum specimens tested for measles IgM increased 127%, from 64,864 to 146,925 during 2010–2015 (Table). The discrepancy between JRF data and monthly reported data was due in part to incomplete monthly reporting. In 2015, among the 160 countries that reported case-based surveillance data, 160,644 serum specimens were received. Of these specimens, 146,925 (91%) were tested for measles IgM (45,674 [31%] positive), and 112,461 (70%) were also tested for rubella IgM (13,601 [12%] positive).

To support virologic surveillance, WHO established standard protocols for monitoring global genotype distribution and tracking transmission of measles and rubella viruses (*6*). During 2010–2015, 27,023 measles virus sequences were submitted to MeaNS and 809 rubella virus sequences were submitted to RubeNS (Table). During 2010–2015, seven of the 24 recognized measles virus genotypes[¶¶] and five of the 13 recognized rubella virus genotypes[***] were detected (Figures 1 and 2). In 2014, a procedure was introduced to MeaNS that designates eligible measles sequences from contemporary outbreak strains as named strains. This designation makes it possible to monitor the global transmission patterns of defined lineages of measles virus (*6*).

[¶¶] Sequences were for the 450-nucleotide carboxy-terminal of the nucleocapsid gene in the measles virus genome. Data as of March 28, 2016 available from the Measles Nucleotide Surveillance (MeaNS) database at http://www.who-measles.org/.

[***] A 739-nucleotide fragment (nucleotides 8,731–9,469) in the E1 gene of rubella viruses is the standard sequence window in the rubella virus genome. Data as of March 28, 2016 available from the Rubella Nucleotide Surveillance (RubeNS) database at http://www.who-rubella.org/.

Accreditation and Quality Assurance

An annual accreditation and proficiency testing program has been developed to ensure high quality standardized laboratory testing and to monitor the performance of serologic testing in the network laboratories (Table). Approximately 95% of participating laboratories passed annually. A GMRLN external quality assurance program for molecular testing was established in 2014 and is coordinated on behalf of WHO by the global specialized laboratory at CDC and at the INSTAND e.V. in Berlin. From 2014 to 2015, the number of laboratories that participated in the molecular proficiency testing program increased from 22 to 90, and all but one passed in 2015.

Quality of Laboratory-Based Surveillance

Performance indicators for collection of samples for case confirmation and timeliness of reporting of laboratory results are being met by most laboratories. However, in 2015,

TABLE. Summary of serologic testing, quality control, and viral sequence submission for the Global Measles and Rubella Laboratory Network (GMRLN), 2010–2015

Characteristic	Year					
	2010	2011	2012	2013	2014	2015
No. of serum samples tested for measles IgM						
Data source*						
JRF	171,170	152,810	148,177	197,469	258,339	NA
Monthly data	64,864	85,953	122,719	160,611	161,115	146,925
No. of GMRLN laboratories participating in the WHO serologic proficiency test panel†						
WHO region						
African	41	35	33	35	37	29
Americas	24	24	24	23	24	8
Eastern Mediterranean	21	18	21	22	21	19
European	69	70	67	71	71	60
South-East Asia	20	13	21	23	24	16
Western Pacific	48	51	51	53	53	53
Total	**223**	**211**	**217**	**227**	**230**	**185**
No. of sequences submitted to the GMRLN databases annually§						
Measles	4,227	5,722	2,847	2,379	7,260	4,588
Rubella	67	143	110	38	147	304

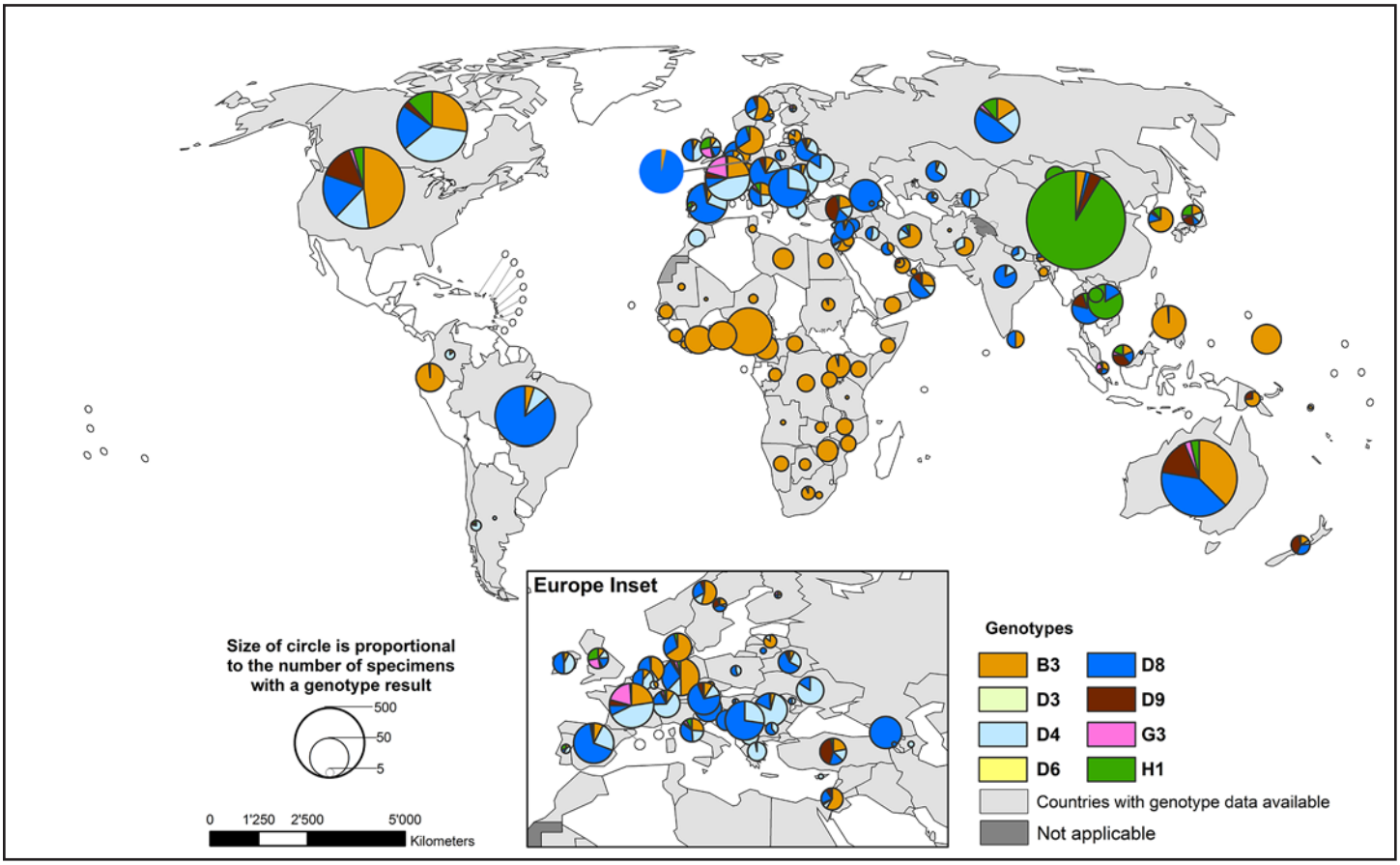
Abbreviations: IgM = immunoglobulin M; JRF = Joint Reporting Form; WHO = World Health Organization.

* The annual number of serum specimens tested by the WHO GMRLN for measles IgM by year during 2010–2015 as reported through the WHO-UNICEF JRF and through the monthly aggregate laboratory data reported to WHO. WHO and UNICEF jointly collect information through a standard questionnaire, the JRF, sent to all member states. Information collected in the JRF includes estimates of national immunization coverage, reported cases of vaccine-preventable diseases, immunization schedules, and indicators of immunization system performances (http://www.who.int/immunization/monitoring_surveillance/routine/reporting/reporting/en). JRF data are available at http://www.who.int/immunization_monitoring/data/data_subject/en/. Monthly reported data are available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html. The discrepancy between JRF data and monthly reported data was due in part to incomplete monthly reporting; for example, in 2014, 37 countries did not report monthly laboratory data. JRF data for 2015 were not available at the time of press.

† An annual accreditation and proficiency testing program to ensure high quality standardized laboratory testing and to monitor the testing performance of the network laboratories. An annual serologic proficiency test panel is administered by the Victorian Infectious Disease Reference Laboratory in Melbourne, Australia. Data for 2015 were incomplete at time of press.

§ Data available as of March 28, 2016 from the Measles Nucleotide Surveillance database (http://www.who-measles.org/) and the Rubella Nucleotide Surveillance database (http://www.who-rubella.org/).

FIGURE 1. Global distribution* of measles virus genotypes,† by country — Measles Nucleotide Surveillance database, 2010–2015



* The size of the pie chart is proportional to the number of sequences reported by the country during 2010–2015, except for China, where the size is reduced tenfold.
† Measles viral sequences were for the 450-nucleotide carboxy-terminal of the nucleocapsid gene. Data available as of March 28, 2016 from the Measles Nucleotide Surveillance database (http://www.who-measles.org/).

62 countries††† (32%) were not able to report rates of discarded cases, and another 46 (24%) reported less than one discarded case per 100,000 population. Twenty (10%) countries reported discarded cases of one to two per 100,000 population, and only 67 (34%) countries achieved the target discarded rate of two or more per 100,000 population.

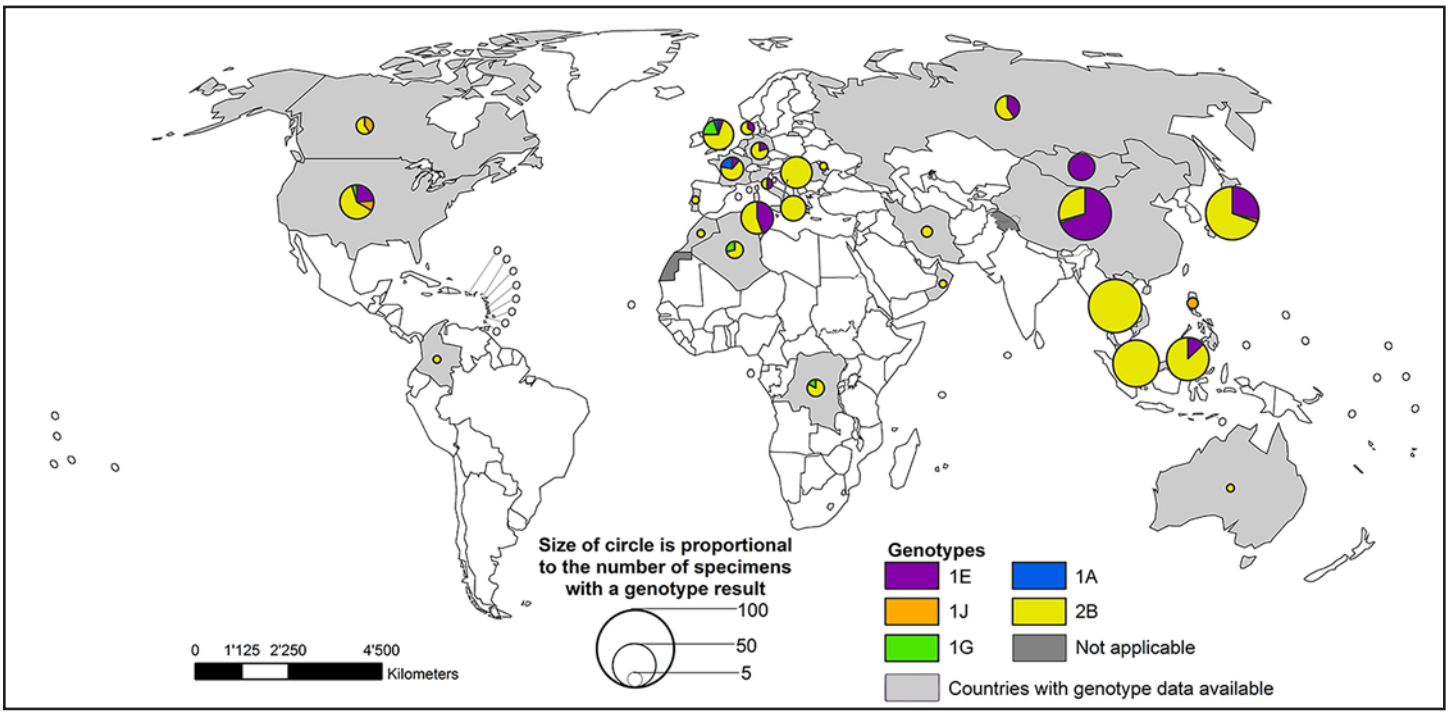
To verify the interruption of endemic measles or rubella virus transmission in a country, detailed epidemiologic case investigations and collection of specimens for virologic sequence analysis are required. Although WHO recommends that genotype information should be obtained from ≥80% of transmission chains, and baseline virologic surveillance should be conducted in all countries (*4*), the number of countries reporting genotype data is much lower than the number of countries reporting laboratory-confirmed cases. In 2015, among the 116 countries that reported laboratory-confirmed measles cases, 56 (48%) reported measles virus genotype information, and among the 106 countries that reported laboratory-confirmed rubella cases, only 11 (10%) reported rubella genotype information (Figures 1 and 2).

Discussion

The capacity of the GMRLN to support elimination efforts substantially increased during 2010–2015; all laboratories now follow standard testing protocols and participate in a rigorous quality control program. In addition, all regional laboratories and many national laboratories have established molecular testing, including reverse transcription–polymerase chain reaction (RT-PCR) and sequence analysis. The global specialized laboratories and regional reference laboratories conduct periodic training workshops and convene annual meetings to review progress and develop recommendations to improve laboratory-based surveillance. In many countries, GMRLN laboratories provide a platform for strengthening

††† Several countries in the European Region, American Region, and Western Pacific Region were unable to report discarded rates because most routine testing is performed by private laboratories.

FIGURE 2. Global distribution* of rubella virus genotypes,† by country — Rubella Nucleotide Surveillance database, 2010–2015



* The size of the pie chart is proportional to the number of sequences reported by the country during 2010–2015.
† A 739-nucleotide fragment (nucleotides 8,731–9,469) in the E1 gene of rubella viruses is the standard sequence window in the rubella virus genome. Data available as of March 28, 2016 from the Rubella Nucleotide Surveillance database (http://www.who-rubella.org/).

overall laboratory capacity and surveillance for other VPDs, including yellow fever and Japanese encephalitis, and support detection and response activities during public health emergencies, such as those caused by the Ebola, chikungunya, dengue, and Zika viruses. Further integration of surveillance for other VPDs, including rotavirus diarrhea, is feasible and will help sustain the investments made in establishing and building GMRLN capacity.

A continuing challenge to the GMRLN is a long-standing shortage of human and financial resources. The workload will increase as the GAVP regional measles and rubella elimination targets draw near. The laboratory network will need to expand to meet the demand for high quality laboratory data to support verification of elimination, particularly in the South-East Asia Region, with two new national laboratories to be nominated in Myanmar and Nepal and at least 20 new subnational laboratories planned for Indonesia, India, and Thailand. To address the challenge of ongoing training needs related to personnel turnover and network expansion, GMRLN conducts workshops and intensive onsite training activities in all regions.

To enhance measles and rubella elimination efforts, the GMRLN continues to develop and evaluate novel technologies, including molecular methods such as RT-PCR to confirm cases. Evaluations of high throughput serologic assays for more efficient assessments of population immunity and point-of-care assays for rapid case confirmation in remote areas have demonstrated promising results as potential new tools. Advanced molecular techniques, including the use of next-generation sequencing, should improve the resolution of molecular epidemiologic studies.

Efforts will increasingly focus on achieving regional measles and rubella elimination goals as polio eradication approaches (*7*). Polio legacy planning has begun to transition polio assets to strengthen routine immunization services and measles and rubella elimination efforts, while maintaining the essential polio functions of containment and surveillance (*8*). In many countries, Global Polio Laboratory Network and GMRLN laboratories are already located in the same institution and share personnel, infrastructure, quality control programs, technical training, and biosafety/biosecurity procedures. An advanced state-of-the-art global laboratory network providing real-time disease surveillance has been the backbone of the polio eradication program. Therefore, ensuring the sustainability and strengthening of the GMLRN should be designated as a high priority for polio legacy planning and transitioning of polio assets.

Summary

What is already known about this topic?

Laboratory confirmation of suspected cases of measles, rubella, and congenital rubella syndrome is an essential component of surveillance for these diseases. The Global Measles and Rubella Laboratory Network (GMRLN), initiated in 2000, has made substantial progress in providing high quality laboratory surveillance needed to verify achievement of measles and rubella elimination targets.

What is added by this report?

The GMRLN is the largest globally coordinated laboratory network, with 703 laboratories supporting surveillance in 191 countries. During 2010–2015, >700,000 serum specimens were tested, and >20,000 viral sequences were reported globally. During the past year, the number of laboratories that participated in molecular proficiency testing increased from 22 to 90. Performance indicators for collection of samples for case confirmation and timeliness of reporting of laboratory results are being met by most laboratories.

What are the implications for public health practice?

High quality surveillance is only possible if suspected measles, rubella, and congenital rubella syndrome cases can be quickly confirmed by the laboratory. The GMRLN's focus on standardization and quality control ensures that public health workers can rely on timely and accurate results. Building and maintaining this advanced state-of-the-art global laboratory network, capable of providing real-time disease surveillance, gives support to measles and rubella elimination efforts and surveillance for other vaccine-preventable diseases and for emerging pathogens of public health concern.

[1]Department of Immunization, Vaccines, and Biologicals, World Health Organization (WHO); [2]Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; [3]Virus Reference Department, Public Health England, Colindale-London, United Kingdom; [4]National Institute of Infectious Diseases, Tokyo, Japan [5]Comprehensive Family Immunization, WHO Regional Office for the Americas, Pan American Health Organization, Washington, D.C.; [6]Vaccine-preventable Diseases and Immunization, WHO Regional Office for Europe, Copenhagen, Denmark; [7]Accelerated Immunisations Initiatives Program, WHO Regional Office for Africa, Intercountry support team West and Central Africa, Ouagadougou, Burkina Faso; [8]Accelerated Immunisations Initiatives Program, WHO Regional Office for Africa, Intercountry support team East and Southern Africa, Harare, Zimbabwe; [9]Vaccine-preventable Diseases and Immunization, WHO Regional Office for the Eastern Mediterranean Region, Cairo, Egypt; [10]Immunization and Vaccine Development, WHO Regional Office for Southeast Asia, New Delhi, India; [11]Expanded Programme on Immunization, WHO Regional Office for Western Pacific, Manila, Philippines; [12]Global Immunization Division, Center for Global Health, CDC.

Corresponding author: James L. Goodson, JGoodson@cdc.gov, 404-639-8170.

References

1. Perry RT, Murray JS, Gacic-Dobo M, et al. Progress toward regional measles elimination—worldwide, 2000–2014. MMWR Morb Mortal Wkly Rep 2015;64:1246–51.
2. World Health Organization. Global measles and rubella strategic plan, 2012–2020. Geneva, Switzerland: World Health Organization; 2012. http://www.who.int/immunization/documents/control/ISBN_978_92_4_150339_6/en/
3. Featherstone D, Brown D, Sanders R. Development of the Global Measles Laboratory Network. J Infect Dis 2003;187(Suppl 1):S264–9. http://dx.doi.org/10.1086/368054
4. World Health Organization. Framework for verifying elimination of measles and rubella. Wkly Epidemiol Rec 2013;88:89–99.
5. Rota PA, Brown K, Mankertz A, et al. Global distribution of measles genotypes and measles molecular epidemiology. J Infect Dis 2011;204(Suppl 1):S514–23. http://dx.doi.org/10.1093/infdis/jir118
6. World Health Organization. Genetic diversity of wild-type measles viruses and the global measles nucleotide surveillance database (MeaNS). Wkly Epidemiol Rec 2015;90:373–80.
7. World Health Organization. Meeting of the International Task Force for Disease Eradication, November 2015. Wkly Epidemiol Rec 2016;91:61–71.
8. Cochi SL, Freeman A, Guirguis S, Jafari H, Aylward B. Global polio eradication initiative: lessons learned and legacy. J Infect Dis 2014;210(Suppl 1):S540–6. http://dx.doi.org/10.1093/infdis/jiu345

Vital Signs: National and State-Specific Patterns of Attention Deficit/Hyperactivity Disorder Treatment Among Insured Children Aged 2–5 Years — United States, 2008–2014

Susanna N. Visser, DrPH[1]; Melissa L. Danielson, MSPH[1]; Mark L. Wolraich, MD[2]; Michael H. Fox, ScD[1]; Scott D. Grosse, PhD[3]; Linda A. Valle, PhD[1]; Joseph R. Holbrook, PhD[1]; Angelika H. Claussen, PhD[1]; Georgina Peacock, MD[1]

On May 3, 2016, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Abstract

Background: Attention deficit/hyperactivity disorder (ADHD) is associated with adverse outcomes and elevated societal costs. The American Academy of Pediatrics (AAP) 2011 guidelines recommend "behavior therapy" over medication as first-line treatment for children aged 4–5 years with ADHD; these recommendations are consistent with current guidelines from the American Academy of Child and Adolescent Psychiatry for younger children. CDC analyzed claims data to assess national and state-level ADHD treatment patterns among young children.

Methods: CDC compared Medicaid and employer-sponsored insurance (ESI) claims for "psychological services" (the procedure code category that includes behavior therapy) and ADHD medication among children aged 2–5 years receiving clinical care for ADHD, using the MarketScan commercial database (2008–2014) and Medicaid (2008–2011) data. Among children with ESI, ADHD indicators were compared during periods preceding and following the 2011 AAP guidelines.

Results: In both Medicaid and ESI populations, the percentage of children aged 2–5 years receiving clinical care for ADHD increased over time; however, during 2008–2011, the percentage of Medicaid beneficiaries receiving clinical care was double that of ESI beneficiaries. Although state percentages varied, overall nationally no more than 55% of children with ADHD received psychological services annually, regardless of insurance type, whereas approximately three fourths received medication. Among children with ESI, the percentage receiving psychological services following release of the guidelines decreased significantly by 5%, from 44% in 2011 to 42% in 2014; the change in medication treatment rates (77% in 2011 compared with 76% in 2014) was not significant.

Conclusions and Comments: Among insured children aged 2–5 years receiving clinical care for ADHD, medication treatment was more common than receipt of recommended first-line treatment with psychological services. Among children with ADHD who had ESI, receipt of psychological services did not increase after release of the 2011 guidelines. Scaling up evidence-based behavior therapy might lead to increased delivery of effective ADHD management without the side effects of ADHD medications.

Introduction

Attention deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder with childhood onset characterized by developmentally inappropriate levels of inattention, hyperactivity, and/or impulsivity and pervasive, significant functional impairment (*1*). As of 2011–2012, approximately 6.4 million U.S. children aged 4–17 years (11%) were reported by parents to have a diagnosis of ADHD, a 42% increase since 2003 (*2*). Nearly one third of children with ADHD (approximately 2 million) received the diagnosis before age 6 years (*3*). Among children described by their parents as having severe ADHD, half of the cases were diagnosed by age 4 years (*2*).

Children with ADHD have higher rates of retention in grade level, high school dropout, unintentional injuries, and emergency department visits (*4*–*6*). Among one third of children with ADHD, the disorder persists into adulthood; among adults with ADHD, the prevalences of lesser educational and career attainment, co-occurring psychiatric disorders, and death by suicide are higher (*7*,*8*). U.S. societal costs of childhood ADHD are estimated at $38–$72 billion annually (*9*).

ADHD is first diagnosed by a primary care physician among 53% of diagnosed cases in children aged 4–17 years; psychiatrists, psychologists, and other physicians such as neurologists diagnose an additional 18%, 14%, and 15% of cases, respectively (*3*). In 2011, American Academy of Pediatrics (AAP) updated guidance for ADHD diagnosis and treatment, recommending behavior therapy as the first line of treatment ahead of stimulant medication (methylphenidate) for treatment of children aged 4–5 years (*10*). Guidance for child and

adolescent psychiatrists also includes the recommendation for psychotherapy before medication in the "very young" (*11*).

Both behavior therapy in the form of "parent training in behavior therapy" (also called parent behavior training) (Box), and psychostimulant medication for children are effective ADHD treatments among those aged <6 years, but the strength of evidence for behavior therapy exceeds that for psychostimulant medication (*12*). Behavior therapy might require more time for achievement of full impact on child behavior and might require more resources; however, the impact lasts longer relative to ADHD medication and does not have the adverse health effects associated with these medications (*12*). Approximately 30% of children aged 3–5 years who take ADHD medications experience adverse effects, most commonly appetite suppression and sleep problems, but also upper abdominal pain ("stomach ache"), emotional outbursts, irritability, lack of alertness, repetitive behaviors and thoughts, social withdrawal, and irritability when the medication wears off (*12–14*). In a large efficacy trial of methylphenidate, >10% of children aged 3–5 years discontinued treatment because of adverse effects (*13*). Children aged 3–5 years taking stimulant medication experience annual growth rates that are 20% lower for height (-1.4 cm/year) and 55% lower for weight (-1.3 kg/year) (*12*). This finding is consistent with the rate of reduced growth among school-aged children taking stimulant medication for ADHD (*15*). In school-aged children, reduced growth rates tend to attenuate over time (*16*).

Based on parent-reported survey data collected just before the 2011 AAP guideline release, 53% of children with ADHD aged 4–5 years had received behavior therapy during the preceding year (the survey did not specify whether the therapy was delivered by a parent trained in behavior therapy or by a therapist or some other provider) and 47% had received medication treatment during the preceding week (*17*). National rates of ADHD treatment among toddlers aged 2–3 years have not been published.

CDC compared rates of psychological services (Box) and medication treatment claims among children aged 2–5 years receiving clinical care for ADHD in the United States who were insured through Medicaid or employer-sponsored insurance (ESI). In a sample of children with ESI, comparisons were made for years preceding and following release of the 2011 AAP guidelines, to assess changes in rates of medication and psychological services for ADHD treatment among children aged 2–5 years.

BOX. Definitions of certain terms used in CDC analysis of Medicaid and employer-sponsored insurance claims data among children aged 2–5 years receiving clinical care for attention deficit/hyperactivity disorder (ADHD)

Psychological services for ADHD

One or more nonpharmacological treatment services included in a set of current procedure codes. These services could be provided directly to the child with ADHD or to the parent of the child with ADHD as part of the child's treatment.

Behavior therapy for ADHD

Psychological service interventions that specifically change problematic behavior, including ADHD symptoms, by altering the physical or social contexts in which the behavior occurs. Services can be delivered to the child by a therapist, teacher, parent, or other provider.

Parent training in behavior therapy (also called parent behavior training) for ADHD

A form of behavior therapy that specifically trains parents in methods to modify their child's problematic behavior, including ADHD symptoms. This form of behavior therapy has been shown by the Agency for Healthcare Research and Quality to have the strongest evidence of effectiveness of any ADHD treatment for children aged <6 years.

Methods

CDC used two administrative claims data sources to characterize ADHD treatment patterns among children aged 2–5 years. Annual data from Medicaid Analytic eXtract files from the Centers for Medicare and Medicaid Services for 2008–2011 were used for children covered by Medicaid insurance for ≥3 continuous months during each calendar year in 29–34 states in each year, depending on data availability and usability (*18–20*). During 2008–2011, the years with the most complete Medicaid data, data were available for 5–7 million children aged 2–5 years for each year from 29–34 states. Twenty-six states had data available during the entire study period. Data from Truven Health MarketScan Commercial Claims and Encounters files for 2008–2014 were used to derive estimates for children covered by ESI. Truven Health provides weights to calculate nationally-representative estimates of children covered by ESI from this convenience sample. In the analytic sample, there were approximately 1 million children aged 2–5 years in the MarketScan commercially insured population in each calendar year. The annual samples from Medicaid and MarketScan data were restricted to children with ≥3 continuous months of coverage whose covered prescription drug claims and mental health visits were included in the analytic databases.*

* For the Medicaid population, about 97% of enrolled children aged 2–5 years were enrolled for at least 3 continuous months during each calendar year. For the MarketScan sample, approximately 55% of all enrolled children aged 2–5 years had prescription drug and mental health visit claims contributed to the MarketScan data files, and of these, approximately 97% had ≥3 months of continuous enrollment.

Three ADHD indicators were developed: receipt of clinical care for ADHD, medication treatment, and receipt of psychological services. Receipt of clinical care for ADHD was defined by two or more outpatient claims[†] with an *International Classification of Diseases Ninth Revision Clinical Modification* (ICD-9) code for ADHD (314.XX) that occurred ≥7 days apart, or one outpatient claim with an ICD-9 ADHD code and two or more claims for FDA-approved ADHD medications that occurred ≥14 days apart.[§] Children in clinical care for ADHD were included in the medication treatment group if they had one or more ADHD medication claim per year and in the psychological services group (Box) if they had one or more outpatient claim with a procedure code related to a psychological treatment service[¶] per year or both. Comparisons of ADHD indicators over time for Medicaid were restricted to 26 states with complete usable data for 2008–2011. Temporal trends of the three ADHD indicators were assessed by year using the Joinpoint Regression Program (*21*) to detect any change in trends over time, including changes following the release of the 2011 AAP guidelines. Comparisons of the three indicators were also made using chi-square tests to compare rates by age of the child and year. Pearson correlation coefficients were calculated to compare these indicators between the Medicaid and ESI populations by year.

Results

Children in Medicaid. In 2011, 106,468 children aged 2–5 years in 34 Medicaid programs received clinical care for ADHD (Table 1), 11,895 (11.2%) of whom were aged 2–3 years. Among 26 assessed state Medicaid programs, the annual percentage of children aged 2–5 years in clinical care for ADHD increased from 1.34% (2008) to 1.50% (2011) ($p<0.001$) (Table 1). During 2008-2011, approximately 78%–79% of children aged 2–5 years in clinical care for ADHD received one or more prescriptions for ADHD medication, and approximately 51%–53% had one or more claims for psychological services (Table 1) (Figure). Each year during 2008–2011, approximately 40% of children with ADHD received medication only, approximately 15% received psychological services only, approximately 40% received both, and approximately 5% received neither (Table 2). During 2008–2011, approximately 80% of children aged 4–5 years with ADHD received medication, compared with approximately 60% of children aged 2–3 years ($p<0.001$). Among children with ADHD in Medicaid, approximately 54% and 56% of children aged 4–5 years and 2–3 years, respectively, received psychological services each year; psychological service

Key Points

- Children diagnosed with attention deficit/hyperactivity disorder (ADHD) can be overly active, have trouble paying attention, and/or have difficulty controlling behavior. They have higher rates of grade retention, high school dropout, unintentional injuries, and emergency department visits.
- About 2 million of the more than 6 million children with ADHD were diagnosed as young children aged 2–5 years. Children with more severe ADHD are more likely to be diagnosed early.
- Behavior therapy in the form of "parent training in behavior therapy" is the recommended first-line treatment for young children with ADHD. It works as well as medication without the risk of side effects. The American Academy of Pediatrics recommends health care providers advise parents of young children with ADHD to obtain training in behavior therapy and practice that before trying medication.
- Among young children with either Medicaid or employer-sponsored insurance, just over 75% of young children in clinical care for ADHD received ADHD medication for treatment. Yet only about 54% of the young children in Medicaid and 45% of the children with employer-sponsored insurance (2011) annually received psychological services (including parent training in behavior therapy). The percentage of young children with ADHD receiving psychological services also has not increased over time.
- Increasing delivery of parent training in behavioral therapy could lead to improved management of ADHD in young children without the side effects of ADHD medication.
- Additional information is available at http://www.cdc.gov/vitalsigns.

[†] Outpatient claims included physician, outpatient, and clinic services not related to inpatient hospital services, prescription drug services, or long-term care.

[§] In order to include all services related to ADHD care, ADHD medication claims that did not include ICD-9 codes were included. FDA-approved medications to treat ADHD in children of any age included amphetamine and mixed amphetamine salts, atomoxetine, clonidine, dextroamphetamine, dexmethylphenidate, guanfacine, lisdexamfetamine, and methylphenidate. Only dextroamphetamine has been approved for use in children as young as age 3 years.

[¶] Current Procedural Terminology (CPT) codes: 90804–90819, 90821–90824, 90826–90829, 90832–90834, 90836–90840, 90845–90847, 90849, 90853, 90857, 99354–99355, and 99510. Healthcare Common Procedure Coding System (HCPCS) codes: G0410, G0411, H0035–H0037, H2012–H2013, H2017–H2020, S9480, and T1027. State-specific codes: 1610 (New York); 5003H, 8226A, 8227A, 8228A, 8245A, 8247A, 8248A, 8245S, 8250A, 8250S (Idaho); CDABF, CDACM, CDAEP, CDAKQ (Alaska); G0177 (Nebraska); Y9935 (New Jersey); and Z1840–Z1841, Z1843 (Ohio).

TABLE 1. Percentage of insured children aged 2–5 years receiving clinical care for attention deficit/hyperactivity disorder (ADHD) and associated treatments received, by type of insurance — United States, 2008–2014

Type of insurance			Children receiving clinical care for ADHD		Children receiving clinical care for ADHD with one or more ADHD medication claim		Children receiving clinical care for ADHD with one or more psychological services claim	
Medicaid	No. of states reporting*	Population in clinical care for ADHD	All reporting states %	States with complete data (n = 26†) %	All reporting states %	States with complete data (n = 26†) %	All reporting states %	States with complete data (n = 26†) %
2008	32	71,162	1.39	1.34	77.6	76.6	52.7§	55.0§
2009	29	79,401	1.41	1.37	77.8	76.8	50.8§	54.7§
2010	33	94,016	1.48	1.43	78.5	77.7	51.0	54.3
2011	34	106,468	1.53	1.50	77.7	77.3	52.6	53.6
Employer-sponsored insurance		**Population in clinical care for ADHD (weighted)**	**National unweighted %**	**National weighted %**	**National unweighted %**	**National weighted %**	**National unweighted %**	**National weighted %**
2008		35,862	0.49	0.46	77.4	76.9	43.8	43.2
2009		39,512	0.51	0.50	77.1	76.7	45.1	44.9
2010		40,184	0.55	0.54	76.3	76.2	44.2	44.0
2011		41,420	0.58	0.56	77.1	76.6	44.0	44.5
2012		43,792	0.62	0.59	77.8	77.4	44.6	45.2
2013		43,465	0.62	0.61	76.2	75.8	42.1	42.6
2014		42,985	0.63	0.60	76.1	75.7	41.7	42.4

Sources: 2008–2011 Medicaid Analytic eXtract files; 2008–2014 Truven Health MarketScan Commercial Claims and Encounters files for employer-sponsored insurance.
* States were included in Medicaid analysis if state-level data were available, deemed usable, and the state Medicaid program did not have a policy that resulted in the provision of behavioral health services by another entity that was not paid directly through Medicaid during the calendar year.
† The 26 states that had complete usable data for each year during 2008–2011 were Alaska, Arkansas, California, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, South Dakota, Tennessee, Texas, Vermont, Virginia, Wisconsin, and Wyoming.
§ Excludes California from pooled percentages for psychological services (unusable data).

use was significantly higher among children aged 2–3 years than among children aged 4–5 years for each year (p<0.05).

Children with employer-sponsored insurance. Among children aged 2–5 years with ESI, approximately 36,000–44,000 received clinical care for ADHD each year during 2008–2014 (Table 1), among whom approximately 2,500–3,000 (6%–7%) were aged 2–3 years. The percentage of children aged 2–5 years with ESI who received clinical care for ADHD increased from 0.46% in 2008 to 0.60% in 2014 (p<0.001) (Table 1). During 2011–2014, the percentage of children with ESI and ADHD medication claims did not change significantly (76.6% to 75.7%; p = 0.23); the percentage with psychological services claims decreased 5%, from 44.5% to 42.4% (p = 0.009) (Table 1) (Figure). The Joinpoint analyses did not detect a significant change in trend throughout the entire period (2008–2014) for either medication treatment or psychological services. During 2008–2014, the distribution of children aged 2–5 years with ESI and ADHD across treatment groups each year was just under half for medication only, approximately 15% for psychological services only, approximately 30% for both, and approximately 10% for neither treatment (Table 2).

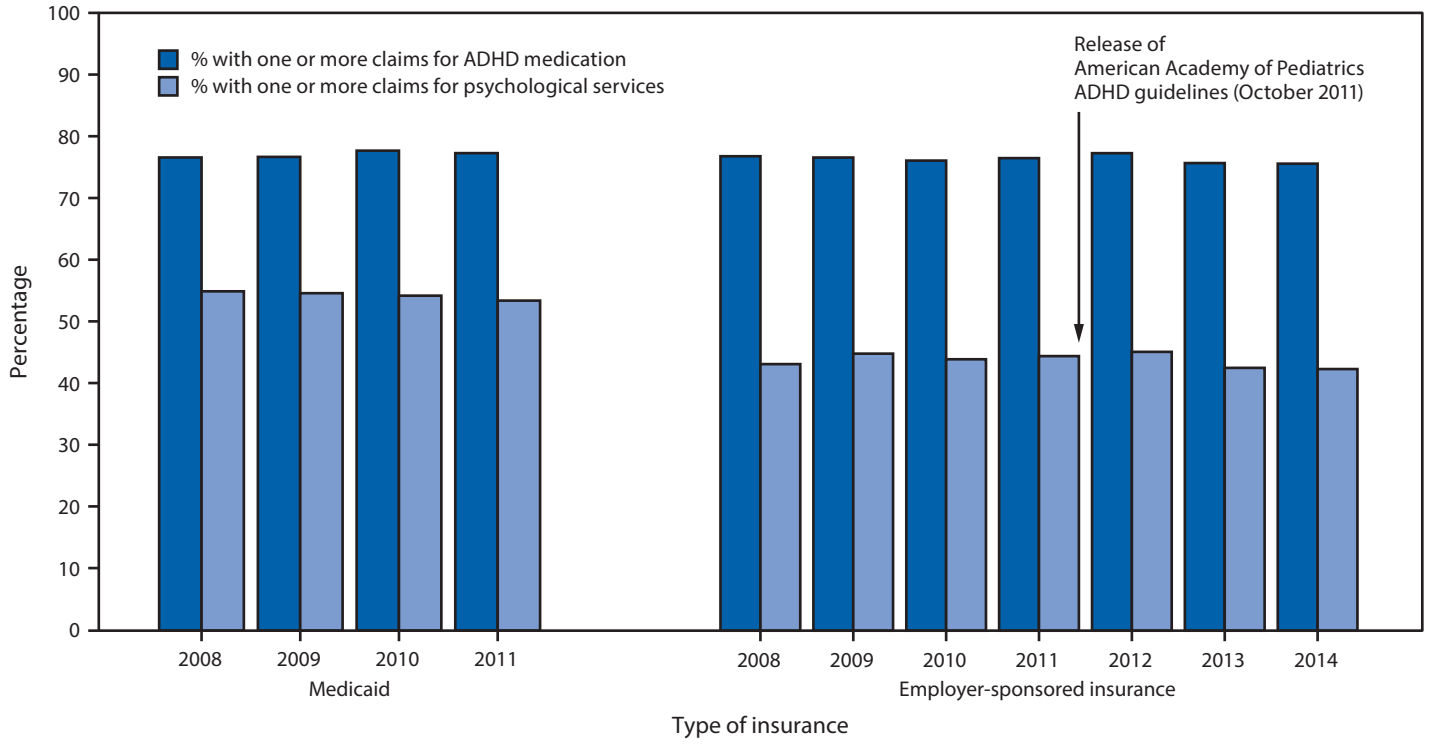
Each year during 2008–2014, the percentage of children aged 4–5 years with ADHD and ESI who received medication was higher (range = 77%–79%) than for children aged 2–3 years (range = 48%–58%) (p<0.001), and a higher proportion of children with ADHD aged 2–3 years received psychological services than children aged 4–5 years (46%–54% compared with 42%–45%; these differences were statistically significant in 2009, 2010, 2011, and 2014).

Children in Medicaid and children with employer-sponsored insurance. For the period covered by both databases (2008–2011), correlations of state-level percentages of children in clinical care for ADHD ranged from 0.74 to 0.87 between databases. During 2008–2011, the percentage of children aged 2–5 years in Medicaid receiving clinical care for ADHD was 2.6–2.9 times greater than that of those with ESI. Across all states with available data, the percentage of children with ADHD medication claims was similar regardless of insurance status, whereas the percentage of children in Medicaid who received psychological services was 13%–22% higher than among that of those in ESI (Table 1). Among both children in Medicaid and children with ESI, ADHD treatment rates varied substantially among states within each calendar year. Three supplemental tables and six U.S. maps showing state-specific data are available at https://stacks.cdc.gov/view/cdc/cdc:39038 and https://stacks.cdc.gov/view/cdc/cdc:39039.

Conclusions and Comment

In 2011, the latest year for which data are available for both Medicaid and ESI populations, nearly 150,000 insured

FIGURE. Percentage of insured children aged 2–5 years receiving clinical care for attention deficit/hyperactivity disorder (ADHD) with one or more claims for ADHD medication and one or more claims for psychological services, by type of insurance* — United States, 2008–2014



Sources: 2008–2011 Medicaid Analytic eXtract files; 2008–2014 Truven Health MarketScan Commercial Claims and Encounters files for employer-sponsored insurance.
* Data from 26 Medicaid state programs with complete usable data for 2008–2011.

children aged 2–5 years received clinical care for ADHD, more than two-thirds of whom were Medicaid beneficiaries. Each year during 2008–2011, the percentage of children in Medicaid receiving care for ADHD was more than twice that for children with ESI. This might be accounted for by the higher percentage of children with ADHD in poverty (*22*), the fact that pediatric ADHD is a basis of eligibility for disability benefits, or differences in behavioral health care practices across health care systems that may result in part from state programs that seek to ensure the delivery of behavioral health services in Medicaid. In both populations, only about 50% of children with ADHD received recommended first-line therapy as measured by receipt of psychological services, whereas approximately three fourths received ADHD medication. ADHD rates varied widely across states in both insured groups, possibly because of differences in how children with ADHD are identified and served in their communities, how these services are documented, or both. There was not an increase in psychological services nor decrease in use of medication after the AAP guidelines release among children with ESI (2011–2014).

Behavior therapy for ADHD, in the form of parent behavior training, and ADHD medications are both recommended ADHD treatments (*10*,*12*). However, among children aged ≤5 years, the number and quality of studies demonstrating effectiveness is higher for parent behavior training than for ADHD medication (*12*). In addition, young children are more susceptible to adverse health effects of ADHD medications, whereas adverse health effects have not been reported for parent behavior training (*12*). ADHD treatment with behavior therapy, which is typically limited in duration, might be associated with better school outcomes (*23*) and more cost-effective over a school year than treatment with ongoing medication (*24*). Further, behavior therapy can also improve problematic behavior in young children who present with symptoms that look like ADHD, such as symptoms of anxiety and oppositional defiant disorder. Collectively, these factors support recommendations (*10*,*11*) for parent training in behavior therapy as first-line treatment for children aged ≤5 years with ADHD.

There are barriers to the receipt of evidence-based behavior therapy training for families of young children with ADHD. First, clinical practice change following guideline or policy change takes time, and practices can vary depending on provider knowledge about the guidelines, the scale of the recommended change, and the amount of support provided to physicians (*25*). Parents and physicians might

TABLE 2. Percentage of insured children aged 2–5 years receiving clinical care for attention deficit/hyperactivity disorder (ADHD) and associated treatments received, by type of insurance, and state reporting status — United States, 2008–2014

Type of insurance	All states with reported data					States with complete data (n = 26*)			
Medicaid	No. of states reporting†	Both medication and psychological services %	Medication only %	Psychological services only %	Neither medication nor psychological services %	Both medication and psychological services %	Medication only %	Psychological services only %	Neither medication nor psychological services %
2008	32	38.2§	40.8§	14.6§	6.4§	39.8§	38.3§	15.2§	6.7§
2009	29	36.5§	42.6§	14.3§	6.6§	39.5§	38.8§	15.2§	6.5§
2010	33	36.3	42.2	14.7	6.8	38.7	38.9	15.6	6.8
2011	34	37.1	40.6	15.5	6.8	37.8	39.5	15.7	7.0

	National unweighted data				National weighted data			
Employer-sponsored insurance	Both medication and psychological services %	Medication only %	Psychological services only %	Neither medication nor psychological services %	Both medication and psychological services %	Medication only %	Psychological services only %	Neither medication nor psychological services %
2008	29.7	47.7	14.1	8.6	29.1	47.8	14.2	8.9
2009	30.8	46.3	14.3	8.6	30.3	46.4	14.6	8.7
2010	29.5	46.8	14.8	8.9	29.3	46.9	14.7	9.1
2011	30.2	46.9	13.8	9.1	30.3	46.3	14.2	9.2
2012	30.9	46.9	13.8	8.5	31.1	46.3	14.1	8.5
2013	27.8	48.4	14.3	9.5	28.0	47.8	14.6	9.6
2014	26.9	49.2	14.8	9.1	27.3	48.5	15.1	9.2

Sources: 2008–2011 Medicaid Analytic eXtract files; 2008–2014 Truven Health MarketScan Commercial Claims and Encounters files for employer-sponsored insurance.
* The 26 states that had complete usable data for each year during 2008–2011 were Alaska, Arkansas, California, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, North Dakota, South Dakota, Tennessee, Texas, Vermont, Virginia, Wisconsin, and Wyoming.
† States were included in Medicaid analysis if state-level data were available, deemed usable, and the state Medicaid program did not have a policy that resulted in the provision of behavioral health services by another entity that was not paid directly through Medicaid during the calendar year.
§ Excludes California from pooled percentages for psychological services (unusable data).

lack awareness of the recommendations and benefits of behavior therapy. Families might have difficulty identifying and accessing providers of evidence-based behavior therapy, and these services might require more resources initially to access than medication. Behavior therapy might not exist in every community, and scaling up these services might be difficult and costly. To overcome these barriers, policymakers, state agencies, and health professional organizations can continue to educate parents and physicians about recommendations while expanding capacity to provide evidence-based services. State agencies and offices, such as Medicaid and Foster Care, can consider programs and policies designed to increase use of behavior therapy for ADHD, including using Title IV-E funds for the state expansion of evidence-based programs. States might also explore policies that influence prescription patterns based on existing evidence of safety and effectiveness, such as prior-authorization policies. To date, 27 state Medicaid programs have implemented prior-authorization policies for pediatric ADHD medication prescriptions.** However, it is also important to consider strategies to increase access to preferred psychological services, particularly among children who are denied medication authorization.

The findings in this report are subject to at least five limitations. First, the population evaluated was children receiving clinical care for ADHD; thus, these rates do not reflect the overall prevalence of children with ADHD. Second, the identified population did not include children in Medicaid programs for which annual data were not available, children receiving clinical care not covered by insurance, and children with a diagnosis of ADHD who had not received sufficient clinical services to meet the case definition. Third, importantly, the psychological services indicator lacked precision, and it was not possible to assess type or quality of psychological services. An inclusive list of psychological services was used as a proxy for behavior therapy with or without an ADHD ICD-code because there are no ADHD-specific behavior therapy procedure codes, although treatments for other externalizing disorders might benefit ADHD symptoms and impairment (*12*), and ADHD might not have been listed as the primary

** http://bit.ly/1RyUHz6.

or secondary diagnosis in the associated claim. Conversely, not all psychological services could be identified using these data because some might not have been covered by insurance (e.g., self-paid or delivered through the education system). However, rates of psychological services among children in this report were similar to those reported for children aged 4–5 years in 2009–2010 using national parent survey data on behavior therapy for ADHD not conditional on having insurance (*17*). Fourth, results represent cross-sectional annual percentages and not lifetime diagnosis or treatment patterns. In addition, children might have been counted multiple times if their insurance status changed during the calendar year (e.g., moved to a different state Medicaid program). Finally, MarketScan data include only children with ESI and might not be generalizable to the entire U.S. population of privately insured children. However, in 2014, among the 52% of children aged 0–18 years who had private insurance, 90% were covered by ESI (*26*).

ADHD is a highly prevalent condition that can lead to poor health and social outcomes (*4–9*). Despite 2007 and 2011 guidelines recommending behavior therapy as first-line treatment for children aged <6 years with ADHD, during 2008–2014 only about half of children aged 2–5 years with ADHD received psychological services. To effectively mitigate impairments associated with ADHD and minimize risks associated with ADHD medications, it is important to increase the percentage of young children with ADHD who receive evidence-based psychological services, especially parent training in behavior therapy.

[1]Division of Human Development and Disability, National Center on Birth Defects and Developmental Disabilities, CDC; [2]University of Oklahoma Health Sciences Center, OU Child Study Center; [3]Office of the Director, National Center on Birth Defects and Developmental Disabilities, CDC.

Corresponding author: Susanna N. Visser, svisser@cdc.gov, 404-498-3008.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Arlington, VA: American Psychiatric Association; 2013.
2. Visser SN, Danielson ML, Bitsko RH, et al. Trends in the parent-report of health care provider-diagnosed and medicated attention-deficit/hyperactivity disorder: United States, 2003–2011. J Am Acad Child Adolesc Psychiatry 2014;53:34–46.e2. http://dx.doi.org/10.1016/j.jaac.2013.09.001
3. Visser SN, Zablotsky B, Holbrook JR, Danielson ML, Bitsko RH. Diagnostic experiences of children with attention-deficit/hyperactivity disorder. Natl Health Stat Report 2015;81:1–7.
4. Barbaresi WJ, Katusic SK, Colligan RC, Weaver AL, Jacobsen SJ. Long-term school outcomes for children with attention-deficit/hyperactivity disorder: a population-based perspective. J Dev Behav Pediatr 2007;28:265–73. http://dx.doi.org/10.1097/DBP.0b013e31811ff87d
5. Merrill RM, Lyon JL, Baker RK, Gren LH. Attention deficit hyperactivity disorder and increased risk of injury. Adv Med Sci 2009;54:20–6.
6. Pastor PN, Reuben CA. Identified attention-deficit/hyperactivity disorder and medically attended, nonfatal injuries: US school-age children, 1997–2002. Ambul Pediatr 2006;6:38–44. http://dx.doi.org/10.1016/j.ambp.2005.07.002
7. Barbaresi WJ, Colligan RC, Weaver AL, Voigt RG, Killian JM, Katusic SK. Mortality, ADHD, and psychosocial adversity in adults with childhood ADHD: a prospective study. Pediatrics 2013;131:637–44. http://dx.doi.org/10.1542/peds.2012-2354
8. Kuriyan AB, Pelham WE Jr, Molina BS, et al. Young adult educational and vocational outcomes of children diagnosed with ADHD. J Abnorm Child Psychol 2013;41:27–41. http://dx.doi.org/10.1007/s10802-012-9658-z
9. Doshi JA, Hodgkins P, Kahle J, et al. Economic impact of childhood and adult attention-deficit/hyperactivity disorder in the United States. J Am Acad Child Adolesc Psychiatry 2012;51:990–1002.e2. http://dx.doi.org/10.1016/j.jaac.2012.07.008
10. Wolraich M, Brown L, Brown RT, et al. ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. Pediatrics 2011;128:1007–22. http://dx.doi.org/10.1542/peds.2011-2654
11. Gleason MM, Egger HL, Emslie GJ, et al. Psychopharmacological treatment for very young children: contexts and guidelines. J Am Acad Child Adolesc Psychiatry 2007;46:1532–72. http://dx.doi.org/10.1097/chi.0b013e3181570d9e
12. Charach A, Dashti B, Carson P, et al. Attention deficit hyperactivity disorder: effectiveness of treatment in at-risk preschoolers; long-term effectiveness in all ages; and variability in prevalence, diagnosis, and treatment. Rockville, MD: Agency for Healthcare Research and Quality; 2011.
13. Wigal T, Greenhill L, Chuang S, et al. Safety and tolerability of methylphenidate in preschool children with ADHD. J Am Acad Child Adolesc Psychiatry 2006;45:1294–303. http://dx.doi.org/10.1097/01.chi.0000235082.63156.27
14. Storebø OJ, Ramstad E, Krogh HB, et al. Methylphenidate for children and adolescents with attention deficit hyperactivity disorder (ADHD). Cochrane Database Syst Rev 2015;11:CD009885.
15. MTA Cooperative Group. National Institute of Mental Health Multimodal Treatment Study of ADHD follow-up: changes in effectiveness and growth after the end of treatment. Pediatrics 2004;113:762–9.
16. Faraone SV, Biederman J, Morley CP, Spencer TJ. Effect of stimulants on height and weight: a review of the literature. J Am Acad Child Adolesc Psychiatry 2008;47:994–1009.
17. Visser SN, Bitsko RH, Danielson ML, et al. Treatment of attention deficit/hyperactivity disorder among children with special health care needs. J Pediatr 2015;166:1423–30.e2. http://dx.doi.org/10.1016/j.jpeds.2015.02.018
18. Byrd VLH, Dodd AH. Medicaid policy brief no. 15. Assessing the usability of encounter data for enrollees in comprehensive managed care across MAX 2007–2009: Centers for Medicare & Medicaid Services; 2012.
19. Byrd VLH, Dodd AH. Medicaid policy brief no. 22. Assessing the usability of encounter data for enrollees in comprehensive managed care 2010–2011. Centers for Medicare & Medicaid Services; 2015.
20. McKinney D, Kidney R, Xu A, Lardiere MR, Schwartz R. Health center reimbursement for behavioral health services in Medicaid. Washington, DC: National Association of Community Health Centers; 2010.
21. Joinpoint trend analysis software. 4.2.0 ed.: Washington, DC: National Cancer Institute; 2015. http://surveillance.cancer.gov/joinpoint/
22. US Department of Health and Human Services and Services Administration & Maternal and Child Health Bureau. Mental health: a report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, National Institute of Mental Health; 1999.

23. Pelham WE, Fabiano GA, Waxmonsky JG, et al. Treatment sequencing for childhood ADHD: A multiple-randomization study of adaptive medication and behavioral interventions. J Clin Child Adolesc Psychol 2016. Epub February 16, 2016. http://dx.doi.org/10.1080/15374416.2015.1105138
24. Page TF, Pelham III WE, Fabiano GA, et al. Comparative cost analysis of sequential, adaptive, behavioral, pharmacological, and combined treatments for childhood ADHD. J Clin Child Adolesc Psychol 2016. Epub January 26, 2016. http://dx.doi.org/10.1080/15374416.2015.1055859
25. Timmermans S, Mauck A. The promises and pitfalls of evidence-based medicine. Health Aff (Millwood) 2005;24:18–28. http://dx.doi.org/10.1377/hlthaff.24.1.18
26. Kaiser Family Foundation. State health facts: health insurance coverage of children 0–18. Washington, DC: Kaiser Family Foundation; 2014. http://kff.org/other/state-indicator/children-0-18/

Update: Ongoing Zika Virus Transmission — Puerto Rico, November 1, 2015–April 14, 2016

Emilio Dirlikov, PhD[1,2]; Kyle R. Ryff, MPH[1]; Jomil Torres-Aponte, MS[1]; Dana L. Thomas, MD[1,3]; Janice Perez-Padilla, MPH[4]; Jorge Munoz-Jordan, PhD[4]; Elba V. Caraballo, PhD[4]; Myriam Garcia[5,6]; Marangely Olivero Segarra, MS[5,6]; Graciela Malave[5,6]; Regina M. Simeone, MPH[7]; Carrie K. Shapiro-Mendoza, PhD[8]; Lourdes Romero Reyes[9]; Francisco Alvarado-Ramy, MD[10]; Angela F. Harris, PhD[11]; Aidsa Rivera, MSN[4]; Chelsea G. Major, MPH[4,12]; Marrielle Mayshack[1,12]; Luisa I. Alvarado, MD[13]; Audrey Lenhart, PhD[14]; Miguel Valencia-Prado, MD[15]; Steve Waterman, MD[4]; Tyler M. Sharp, PhD[4]; Brenda Rivera-Garcia, DVM[1]

On April 29, 2016, this report was posted as an MMWR Early Release on the MMWR website (http://www.cdc.gov/mmwr).

Zika virus is a flavivirus transmitted primarily by *Aedes* species mosquitoes, and symptoms of infection can include rash, fever, arthralgia, and conjunctivitis (*1*).* Zika virus infection during pregnancy is a cause of microcephaly and other severe brain defects (*2*). Infection has also been associated with Guillain-Barré syndrome (*3*). In December 2015, Puerto Rico became the first U.S. jurisdiction to report local transmission of Zika virus, with the index patient reporting symptom onset on November 23, 2015 (*4*). This report provides an update to the epidemiology of and public health response to ongoing Zika virus transmission in Puerto Rico. During November 1, 2015–April 14, 2016, a total of 6,157 specimens from suspected Zika virus–infected patients were evaluated by the Puerto Rico Department of Health (PRDH) and CDC Dengue Branch (which is located in San Juan, Puerto Rico), and 683 (11%) had laboratory evidence of current or recent Zika virus infection by one or more tests: reverse transcription–polymerase chain reaction (RT-PCR) or immunoglobulin M (IgM) enzyme-linked immunosorbent assay (ELISA). Zika virus–infected patients resided in 50 (64%) of 78 municipalities in Puerto Rico. Median age was 34 years (range = 35 days–89 years). The most frequently reported signs and symptoms were rash (74%), myalgia (68%), headache (63%), fever (63%), and arthralgia (63%). There were 65 (10%) symptomatic pregnant women who tested positive by RT-PCR or IgM ELISA. A total of 17 (2%) patients required hospitalization, including 5 (1%) patients with suspected Guillain-Barré syndrome. One (<1%) patient died after developing severe thrombocytopenia. The public health response to the outbreak has included increased laboratory capacity to test for Zika virus infection (including blood donor screening), implementation of enhanced surveillance systems, and prevention activities focused on pregnant women. Vector control activities include indoor and outdoor residual spraying and reduction of mosquito breeding environments focused around pregnant women's homes. Residents of and travelers to Puerto Rico should continue to employ mosquito bite avoidance behaviors, take precautions to reduce the risk for sexual transmission (*5*), and seek medical care for any acute illness with rash or fever.

Epidemiologic Surveillance

In response to the introduction of Zika virus, PRDH and CDC Dengue Branch incorporated Zika virus case reporting and diagnostic testing into existing dengue and chikungunya virus surveillance systems and developed a laboratory-based Passive Arboviral Diseases Surveillance System.† Health providers submit serum specimens to PRDH from patients with a clinical suspicion of Zika, chikungunya, or dengue virus infection using a case report form.§ Depending on the number of days between onset of illness and specimen collection, specimens are tested for the three arboviruses by a Trioplex RT-PCR assay, for evidence of Zika and dengue virus infection by IgM ELISA, or by both assays (*4*).¶ Zika virus–infected patients were defined by positive results from either RT-PCR (confirmed) or IgM ELISA with negative dengue virus IgM ELISA (presumptive positive). Zika virus testing has been incorporated into the Sentinel Enhanced Dengue Surveillance System, which tests specimens from all febrile patients treated at either one outpatient clinic or one hospital emergency department in Ponce. Tissue and blood specimens collected during autopsy from patients who died after an acute febrile illness are tested for Zika virus infection through the Enhanced Fatal Acute Febrile Illness Surveillance System.** Following CDC interim guidance (*6*), symptomatic pregnant women are tested using the diagnostic algorithm, and asymptomatic pregnant women are tested for evidence of Zika and dengue virus infection by IgM ELISA. Initiated in February 2016, the Guillain-Barré syndrome Passive Surveillance System allows health providers from across the

* http://www.cdc.gov/zika/.

† http://www.salud.gov.pr/Sobre-tu-Salud/Pages/Condiciones/Zika.aspx.

§ http://www.salud.gov.pr/Sobre-tu-Salud/Documents/NEW%20Arbovirus%20Case%20Investigation%20Form%20-%20March%2029%202016.pdf.

¶ http://www.fda.gov/%20EmergencyPreparedness/Counterterrorism/MedicalCountermeasures/MCMIssues/ucm485199.htm.

** The Enhanced Fatal Acute Febrile Illness Surveillance System is co-operated by PRDH, Institute of Forensic Sciences of Puerto Rico, and CDC.

island to report clinically suspected Guillain-Barré syndrome cases by sending a case report form and serum specimen to PRDH.[††] Specimens from patients with suspected Guillain-Barré syndrome are tested by both RT-PCR and IgM ELISA for all three arboviruses. Diagnostic test results are managed through an integrated data management system. Results are reported to providers, and aggregate data are available online in a weekly arboviral report.[§§]

During November 1, 2015–April 14, 2016, specimens from 6,157 suspected arbovirus-infected patients were evaluated and 683 (11%) were either laboratory-confirmed or presumptive positive for Zika virus infection (Table). Of these 683 Zika virus laboratory confirmed or presumptive patients, 581 (85%) were confirmed by RT-PCR, 73 (11%) were presumptive positive by IgM ELISA, and 29 (4%) were positive by both RT-PCR and IgM ELISA. Dengue, chikungunya, or unspecified flavivirus infection was identified in 110 (2%), 61 (1%), and 32 (<1%) suspected arbovirus-infected patients, respectively. No patients with evidence of coinfection with Zika, dengue, or chikungunya viruses were identified by RT-PCR. Of all identified Zika virus–infected patients, 646 (95%) were reported to the Passive Arboviral Diseases Surveillance System. Thirty-two (5%) Zika virus–infected patients were reported through the Sentinel Enhanced Dengue Surveillance System. Five (1%) suspected cases of Guillain-Barré syndrome reported to the Guillain-Barré syndrome Passive Surveillance System were presumptive positive for Zika virus infection, and two had unspecified flavivirus infection.

Weekly Zika virus disease case counts gradually increased since late November 2015, whereas incidence of dengue and chikungunya cases remained comparatively low (Figure 1). Zika virus–infected patients were reported from 50 (64%) of the 78 total municipalities (Figure 2); 146 (21%) patients were residents of the San Juan metropolitan area. Among all identified Zika virus–infected patients, 436 (64%) were female, and median age was 34 years (range = 35 days–89 years). The most frequently reported signs and symptoms were rash (74%), myalgia (68%), headache (63%), fever (63%), and arthralgia (63%). Thrombocytopenia (defined as blood platelets levels <100,000 cells/mm^3) was reported in nine (1%) cases. Sixty-five (10%) symptomatic pregnant women were Zika virus–infected patients. Seventeen (2%) patients required hospitalization, including five (1%) suspected Guillain-Barré syndrome cases. In one (<1%) identified Zika virus–associated case, the patient died of complications related to severe thrombocytopenia.

TABLE. Demographic characteristics, clinical course, and signs and symptoms of patients* with Zika virus disease (N = 683) — Puerto Rico, November 1, 2015–April 14, 2016

Characteristic	No. of patients (%)
History of recent travel†	4 (1)
Female	436 (64)
Pregnant	65 (10)
Hospitalized	17 (2)
Suspected GBS§	5 (1)
Thrombocytopenia¶	9 (1)
Deaths	1 (<1)
Signs and symptoms**	
Rash	505 (74)
Myalgia	462 (68)
Headache	433 (63)
Fever	429 (63)
Arthralgia	428 (63)
Eye pain	350 (51)
Chills	344 (50)
Sore throat	233 (34)
Petechiae	213 (31)
Conjunctivitis	137 (20)
Nausea/Vomiting	123 (18)
Diarrhea	115 (17)

Abbreviation: GBS = Guillain-Barré syndrome.
* Patients were aged 35 days–89 years (median age = 34 years).
† Travel outside of Puerto Rico and the United States in the 14 days before illness onset.
§ All GBS patients were hospitalized.
¶ Defined as blood platelets levels <100,000 cells/mm^3.
** Signs and symptoms were reported by the patients' clinician.

To ensure the safety of the blood supply, Puerto Rico imported all blood products from the United States during March 5–April 14 (*7*). On April 2, blood collection resumed with donor screening using a Food and Drug Administration–approved Zika virus investigational nucleic acid detection test (Roche Molecular Systems, Inc., Pleasanton, California). Emergency blood imports ended on April 15. During April 2–14, nine (<1%) of 1,910 screened donated blood units had positive test results. These units were removed from the blood supply, and testing is pending to confirm presumptive Zika virus infection.

Public Health Response

Through the Zika Active Pregnancy Surveillance System, Zika virus–infected pregnant women and their offspring are monitored for adverse maternal, fetal, neonatal, infant, and child health outcomes.[¶¶] Surviving offspring across the island will be referred to the Children with Special Health Care Needs program for developmental surveillance and coordination of specialized services, as needed, up to age 3 years. The Birth Defects Surveillance System[***] will identify newborns with congenital

[††] Patients from across the island with clinical suspicion of Guillain-Barré syndrome can be reported to PRDH (http://www.salud.gov.pr/Sobre-tu-Salud/Documents/ingl%c3%a9s.pdf).
[§§] http://www.salud.gov.pr/Estadisticas-Registros-y-Publicaciones/Pages/Informe-Arboviral.aspx.
[¶¶] Zika Active Pregnancy Surveillance System is co-operated by PRDH and CDC.
[***] PRDH routinely monitors birth defects throughout the island through the Birth Defect Surveillance System.

FIGURE 1. Cases of Zika virus disease (n = 683), dengue (n = 110), and chikungunya (n = 61) by week of onset of patient's illness — Puerto Rico, November 1, 2015–April 14, 2016

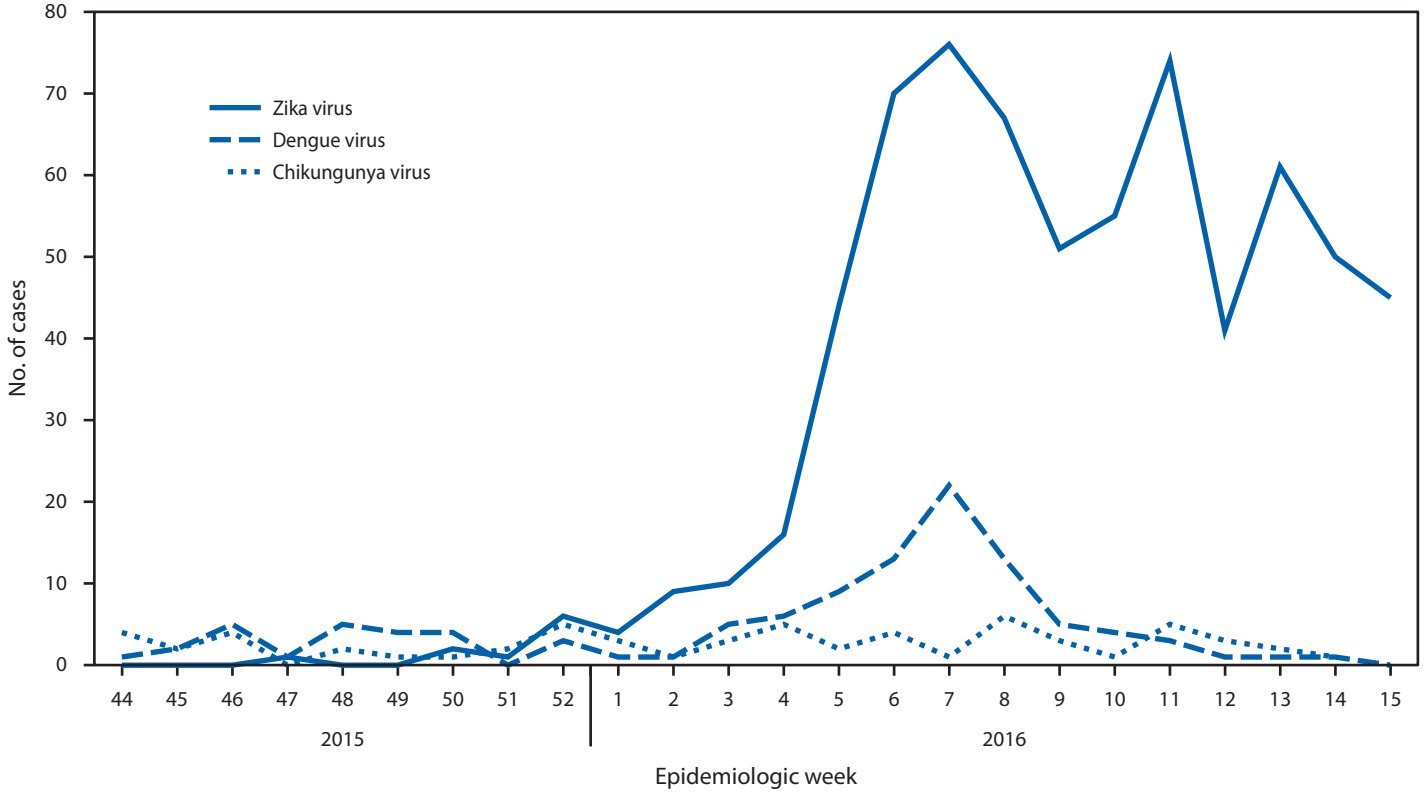
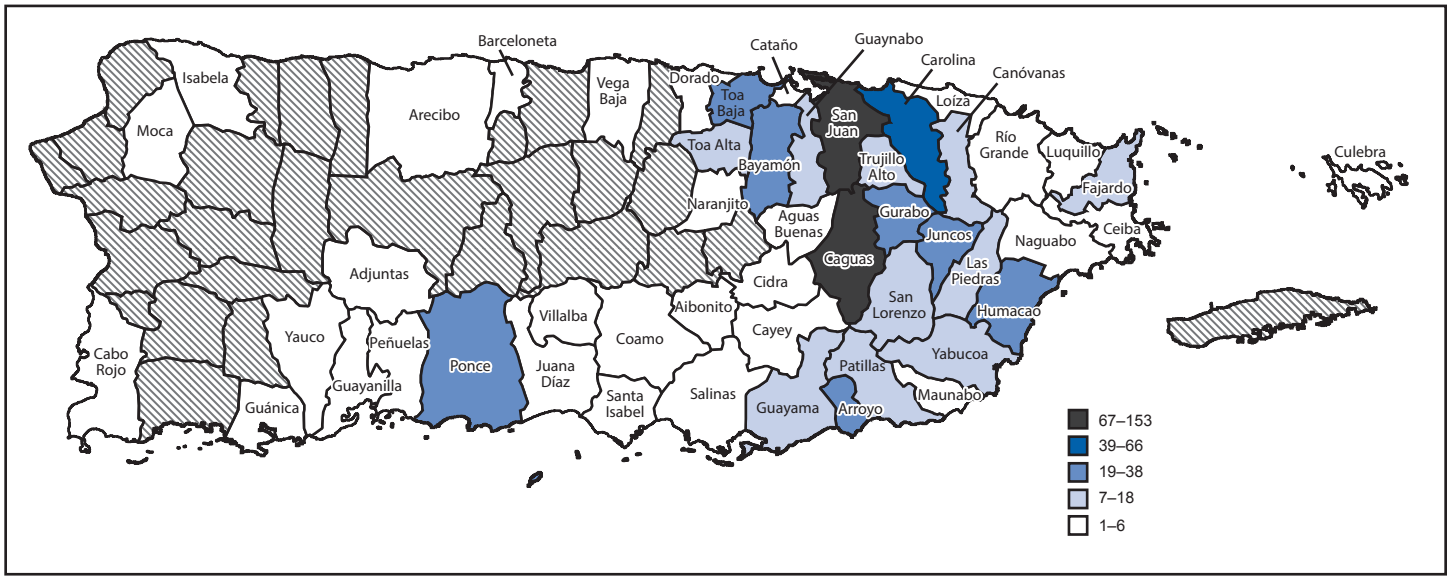


FIGURE 2. Municipality of residence of persons with Zika virus disease (n = 679)* — Puerto Rico, November 1, 2015–April 14, 2016



* Four cases were reported with unknown municipality of residence.

microcephaly, including those born to women infected with Zika virus during pregnancy, and refer all cases to Avanzando Juntos, Puerto Rico's Early Intervention Services System.

With CDC's assistance, PRDH has also implemented comprehensive strategies to prevent Zika virus transmission. Health messaging, including posters and electronic monitors, have been implemented and health education materials are available at various locations, including health care facilities and ports of entry. Community intervention strategies have focused on pregnant women. PRDH has worked closely with Women, Infants, and Children (WIC) clinics, where 90% of Puerto Rican pregnant women received services in 2015 (Dana Miró Medina, WIC Puerto Rico, personal communication, 2016). As of April 13, a total of 13,351 pregnant women participated in Zika virus educational orientations offered by WIC clinics. PRDH and the CDC Foundation financed the purchase and delivery of Zika Prevention Kits, which include locally adapted health information, mosquito repellent, a bed net, larvicidal tablets (tablets placed in water sources where mosquitoes might breed that prevent larvae from maturating into adults), and condoms. In addition, to reduce the risk for unintended pregnancies with adverse fetal outcomes related to Zika virus infection, the response includes increasing the availability of contraceptives (*8*).

During February–March, an insecticide resistance study of *Aedes aegypti* mosquitoes was conducted to develop vector control strategies, such as truck-mounted, ultra-low volume spraying and indoor and outdoor residual spraying. Mosquitoes from across Puerto Rico were tested using the CDC bottle bioassay to determine insecticide susceptibility, particularly against pyrethroids. Results indicated a high degree of geographical variation with respect to susceptibility to insecticides, and deltamethrin was identified as the most suitable pyrethroid candidate for use in vector control programs (data not shown). Insecticide susceptibility surveillance is ongoing.

A home-based vector control program focused on pregnant women is underway. Women are contacted through WIC clinics, and are offered source reduction services (e.g., removal of water containers that can serve as mosquito breeding sites), larvicide application, and indoor and outdoor residual spraying using deltamethrin. PRDH and CDC have collaborated with the Puerto Rico Department of Housing to incorporate these services into its vector control activities.

Discussion

Zika virus remains a public health challenge in Puerto Rico, and cases are expected to continue to occur throughout 2016. Building upon existing dengue and chikungunya virus surveillance systems, PRDH collaborated with CDC to establish a comprehensive surveillance system to characterize the incidence and epidemiology of Zika virus disease on the island. Expanded laboratory capacity and surveillance provided timely availability of data, allowing for continuous analysis and adapted public health response. Following CDC guidelines, both symptomatic and asymptomatic pregnant women are tested for evidence of Zika virus infection. Information from the Zika Active Pregnancy Surveillance System will be used to raise awareness about the complications associated with Zika virus during pregnancy, encourage prevention through use of mosquito repellent and other methods, and inform health care providers of the additional care needed by women infected with Zika virus during pregnancy, as well as congenitally exposed fetuses and children. In addition, the prevalence of adverse fetal outcomes documented through this system can be compared with baseline rates as further evidence of associations between Zika virus infections and adverse outcomes, such as microcephaly (*2*).

The finding that women constitute the majority of cases might be attributable to targeted outreach and testing. The most common symptoms among Zika virus disease cases were rash, myalgia, headache, fever, and arthralgia, which are similar to the most common signs and symptoms reported elsewhere in the Americas (*9*). Although Zika virus–associated deaths are rare (*10*), the first identified death in Puerto Rico highlights the possibility of severe cases, as well as the need for continued outreach to raise health care providers' awareness of complications that might lead to severe disease or death. To ensure continued blood safety, blood collection resumed

Summary

What is already known about this topic?

Zika virus transmission in Puerto Rico has been ongoing, with the first patient reporting symptom onset in November 2015. Zika virus infection is a cause of microcephaly and other severe birth defects. Zika virus infection has also been associated with Guillain-Barré syndrome.

What is added by this report?

During November 1, 2015–April 14, 2016, a total of 6,157 specimens from suspected Zika virus–infected patients from Puerto Rico were evaluated and 683 (11%) had laboratory evidence of current or recent Zika virus infection. The public health response includes increased capacity to test for Zika virus, preventing infection in pregnant women, monitoring infected pregnant women and their fetus for adverse outcomes, controlling mosquitos, and assuring the safety of blood products.

What are the implications for public health practice?

Residents of and travelers to Puerto Rico should continue to employ mosquito bite avoidance behaviors, take precautions to reduce the risk for sexual transmission, and seek medical care for any acute illness with rash or fever. Clinicians who suspect Zika virus disease in patients who reside in or have recently returned from areas with ongoing Zika virus transmission should report cases to public health officials.

with a donor screening program for Zika virus infection, and all units screened positive are removed.

Residents of and travelers to Puerto Rico should continue to employ mosquito bite avoidance behaviors, including using mosquito repellents, wearing long-sleeved shirts and pants, and ensuring homes are properly enclosed (e.g., screening windows and doors, closing windows, and using air conditioning) to avoid bites while indoors.††† To reduce the risk for sexual transmission, especially to pregnant women, precautions should include consistent and proper use of condoms or abstinence (*5*). Such measures can also help avoid unintended pregnancies and minimize risk for fetal Zika virus infection (*6*). Clinicians who suspect Zika virus disease in patients who reside in or have recently returned from areas with ongoing Zika virus transmission should report cases to public health officials.

††† http://www.cdc.gov/zika/prevention/.

[1]Office of Epidemiology and Research, Puerto Rico Department of Health; [2]Epidemic Intelligence Service, Division of Scientific Education and Professional Development, CDC; [3]Division of State and Local Readiness, Office of Public Health Preparedness and Response, CDC; [4]Division of Vector-Borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC; [5]Biological and Chemical Emergencies Laboratory, Office of Public Health Preparedness and Response, Puerto Rico Department of Health; [6]Public Health Laboratory, Puerto Rico Department of Health; [7]Division of Congenital and Developmental Disorders, National Center on Birth Defects and Developmental Disabilities, CDC; [8]Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, CDC ; [9]Puerto Rico Women, Infants, and Children Program; [10]Division of Global Migration and Quarantine, National Center for Emerging and Zoonotic Infectious Diseases, CDC; [11]Bill & Melinda Gates Foundation, Seattle, WA; [12]Office for State, Tribal, Local, and Territorial Support, CDC; [13]Ponce Health Sciences University-Saint Luke's Episcopal Hospital Consortium, Puerto Rico; [14]Division of Parasitic Diseases and Malaria, Center for Global Health, CDC; [15]Puerto Rico Birth Defects Surveillance and Prevention System, Puerto Rico Department of Health.

Corresponding author: Emilio Dirlikov, Zika@salud.gov.pr, 787-765-2929.

Acknowledgment

Kathryn Conlon, PhD, National Center for Environmental Health, CDC.

References

1. Petersen LR, Jamieson DJ, Powers AM, Honein MA. Zika virus. N Engl J Med 2016;374:1552–63. http://dx.doi.org/10.1056/NEJMra1602113
2. Rasmussen SA, Jamieson DJ, Honein MA, Petersen LR. Zika virus and birth defects—reviewing the evidence for causality. N Engl J Med 2016. Epub April 13, 2016. http://www.nejm.org/doi/full/10.1056/NEJMsr1604338
3. Cao-Lormeau VM, Blake A, Mons S, et al. Guillain-Barré syndrome outbreak associated with Zika virus infection in French Polynesia: a case-control study. Lancet 2016;387:1531–9. http://dx.doi.org/10.1016/S0140-6736(16)00562-6
4. Thomas DL, Sharp TM, Torres J, et al. Local transmission of Zika virus—Puerto Rico, November 23, 2015-January 28, 2016. MMWR Morb Mortal Wkly Rep 2016;65:154–8. http://dx.doi.org/10.15585/mmwr.mm6506e2
5. Oster AM, Russell K, Stryker JE, et al. Update: interim guidance for prevention of sexual transmission of Zika virus—United States, 2016. MMWR Morb Mortal Wkly Rep 2016;65:323–5. http://dx.doi.org/10.15585/mmwr.mm6512e3
6. Petersen EE, Polen KN, Meaney-Delman D, et al. Update: interim guidance for health care providers caring for women of reproductive age with possible Zika virus exposure—United States, 2016. MMWR Morb Mortal Wkly Rep 2016;65:315–22. http://dx.doi.org/10.15585/mmwr.mm6512e2
7. Vasquez AM, Sapiano MR, Basavaraju SV, Kuehnert MJ, Rivera-Garcia B. Survey of blood collection centers and implementation of guidance for prevention of transfusion-transmitted Zika virus infection—Puerto Rico, 2016. MMWR Morb Mortal Wkly Rep 2016;65:375–8. http://dx.doi.org/10.15585/mmwr.mm6514e1
8. Tepper NK, Goldberg HI, Bernal MI, et al. Estimating contraceptive needs and increasing access to contraception in response to the Zika virus disease outbreak—Puerto Rico, 2016. MMWR Morb Mortal Wkly Rep 2016;65:311–4. http://dx.doi.org/10.15585/mmwr.mm6512e1
9. Brasil P, Calvet GA, Siqueira AM, et al. Zika virus outbreak in Rio de Janeiro, Brazil: clinical characterization, epidemiological and virological aspects. PLoS Negl Trop Dis 2016;10:e0004636. http://dx.doi.org/10.1371/journal.pntd.0004636
10. Sarmiento-Ospina A, Vásquez-Serna H, Jimenez-Canizales CE, Villamil-Gómez WE, Rodriguez-Morales AJ. Zika virus associated deaths in Colombia. Lancet Infect Dis 2016;16:523–4. http://dx.doi.org/10.1016/S1473-3099(16)30006-8

Notes from the Field

Assessment of Health Facilities for Control of Canine Rabies — Gondar City, Amhara Region, Ethiopia, 2015

Emily G. Pieracci, DVM[1,2]; Betsy Schroeder, MPH[3]; Araya Mengistu, DVM, PhD[4]; Achenef Melaku, DVM[4]; Miriam Shiferaw, MD[5]; Jesse D. Blanton, MPH[5]; Ryan Wallace, DVM[5]

Rabies is an encephalitic disease that is nearly always fatal after onset of illness. Worldwide, rabies kills an estimated 59,000 humans each year (95% confidence interval [CI] = 25,000–159,000); the majority of the deaths are caused by the rabies virus variant that circulates in dogs (*1*,*2*). Canine rabies is endemic in Ethiopia, with an estimated 2,771 human deaths annually (CI = 1,116–12,660) (*1*–*3*). Annual rabies-associated livestock losses are estimated at >$50 million (USD), making rabies important to both human and animal health (*1*).

Human health care delivery in Ethiopia occurs through hospitals, health centers, and health posts. The Ethiopian government runs veterinary clinics, and some private veterinarians operate in large cities; however, human and animal health providers do not routinely collaborate to control zoonotic diseases. The World Organisation for Animal Health's *Tool for the Evaluation of Performance of Veterinary Services* identified a need to improve animal disease surveillance as well as collaboration on zoonotic diseases between the Ministry of Health and veterinary services in Ethiopia (*4*).

Dog bites are nationally notifiable in Ethiopia and bite victims are referred to health centers for rabies postexposure prophylaxis (PEP). No additional public health interventions occur at the community level. In an integrated bite-case management (IBCM) program, animal health workers would investigate biting dogs to provide the health sector with information for rabies risk assessments. Studies have shown that IBCM can increase bite detection rates by up to 30% and decrease unnecessary PEP by 60% (*5*). Because IBCM represents integration of both human and animal health, it offers an opportunity to prevent human rabies deaths as well as decrease the high costs of unnecessary PEP.

In January 2015, CDC, in collaboration with Ohio State University, the University of Gondar (Amhara Region, Ethiopia), and the Ethiopian Public Health Institute developed an IBCM pilot program in the city of Gondar. Bite events are reported from human health sectors to animal health workers, who conduct animal rabies assessments to guide management decisions for exposed persons. Program goals include recording dog bites, testing suspected rabid dogs, and reducing community rabies exposures.

In September 2015, a CDC team evaluated the IBCM pilot program and assessed the feasibility of program expansion. The evaluation included informal interviews with animal health workers, laboratorians, and program supervisors, and field observation of animal health workers. The feasibility assessment included semi-structured interviews with key stakeholders at human and animal health facilities and evaluation of infrastructural requirements necessary for IBCM program expansion (i.e., cold-chain capacity, sample transportation, and access to rabies vaccines).

Delays in the distribution of funds and shortages of PEP slowed program implementation during the first 9 months. In addition, the preference of community members to seek bite-wound treatment from traditional healers rather than health professionals resulted in a low dog-bite reporting rate. Rabies diagnostic testing capacity was lacking, related to delays in construction of a regional animal disease diagnostic center. Quarantine facilities for suspected rabid dogs did not adhere to international animal welfare regulations; therefore, most suspected rabid animals were quarantined within owners' homes. Inconsistencies in animal health workers' handling of animals, including euthanasia practices and sample collection, also hampered implementation. Resource gaps included inadequate access to PEP and canine vaccines and a lack of cold-chain capacity.

Despite the implementation challenges, efforts were undertaken to enhance IBCM capacity in Gondar through training of additional animal health workers, laboratorians, and program supervisors. Ethiopia has regional and national plans to increase access to PEP and canine rabies vaccine during the next year. A national animal rabies surveillance system, based on IBCM, is being jointly developed by human and animal health agencies with CDC support, and will be implemented in the Amhara Region during 2016. Construction of the rabies laboratory is under way, and temporary diagnostic laboratory space has been identified. Construction of regional quarantine facilities is expected to begin in 2016. During the feasibility assessments, the IBCM program was introduced to clinicians unaware of this activity.

Further work is needed to increase community reporting of suspected rabid dogs through improved awareness of the IBCM program. Expanded access to WHO-approved PEP is needed, but distribution of vaccine should be limited to facilities with stable cold-chain capacity. Traditional healers should be encouraged to refer dog-bite victims for PEP, and health clinics and veterinary facilities should coordinate IBCM investigations. Enhancement of the IBCM program is anticipated to continue as the program is introduced in new areas.

[1]Epidemic Intelligence Service, CDC; [2]Division of Vector-Borne Diseases, National Center for Emerging Zoonotic Infectious Diseases, CDC; [3]Virginia-Maryland College of Veterinary Medicine; [4]University of Gondar, Amhara Region, Ethiopia; [5]Division of High-Consequence Pathogens and Pathology, National Center for Emerging Zoonotic Infectious Diseases, CDC.

Corresponding author: Emily G. Pieracci, epieracci@cdc.gov, 404-639-2603.

References

1. Hampson K, Coudeville L, Lembo T, et al. Estimating the global burden of endemic canine rabies. PLoS Negl Trop Dis 2015;9:e0003709. http://dx.doi.org/10.1371/journal.pntd.0003709
2. Jemberu WT, Molla W, Almaw G, Alemu S. Incidence of rabies in humans and domestic animals and people's awareness in North Gondar Zone, Ethiopia. PLoS Negl Trop Dis 2013;7:e2216. http://dx.doi.org/10.1371/journal.pntd.0002216
3. Paulos A, Eshetu Y, Bethelhem N, et al. A study on the prevalence of animal rabies in Addis Ababa during 1999–2002. Ethiopian Veterinary Journal 2002;7:69–77.
4. World Organisation for Animal Health (OIE). OIE tool for the evaluation of performance of veterinary services. 6th ed. Paris, France: World Organisation for Animal Health; 2013. http://www.oie.int/fileadmin/Home/eng/Support_to_OIE_Members/pdf/PVS_A_Tool_Final_Edition_2013.pdf
5. Wallace RM, Reses H, Franka R, et al. Establishment of a high canine rabies burden in Haiti through the implementation of a novel surveillance program. PLoS Negl Trop Dis 2015;9:e0004245. http://dx.doi.org/10.1371/journal.pntd.0004245

Announcement

Updated Guidelines for Antiretroviral Postexposure Prophylaxis after Sexual, Injection-Drug Use, or Other Nonoccupational Exposure to HIV — United States, 2016

New evidence-based guidelines, *Updated Guidelines for Antiretroviral Postexposure Prophylaxis after Sexual, Injection-Drug Use, or Other Nonoccupational Exposure to HIV — United States, 2016,* are now available online (http://www.cdc.gov/hiv/guidelines/). The guidelines update and expand the 2005 U.S. Department of Health and Human Services recommendations for clinical care providers regarding nonoccupational postexposure prophylaxis (nPEP) for exposure to human immunodeficiency virus (HIV) outside the health care setting for persons in the United States (*1*). Materials supporting nPEP guidelines implementation will also be posted online when they become available.

The updated guidelines are intended to assist U.S. clinicians in reducing the occurrence of new HIV infections through effective delivery of nPEP to patients shortly after they have a single exposure outside of health care settings to blood, genital secretions, or other potentially infectious body fluids that might contain HIV. This update incorporates new scientific evidence from human and animal studies and includes pediatric dosing information. The update was prompted by new information regarding the clinical delivery of nPEP, the development of newer, better-tolerated antiretroviral drug regimens with reduced side effects, and new estimates of cost-effectiveness of nPEP as an HIV prevention method. Updated occupational PEP guidelines for use following possible HIV exposures in health care settings were published separately in 2013 (*2*).

In addition to clinicians who provide medical care to patients, the nPEP guidelines might also be of interest to the following: emergency medicine technicians, social workers, administrators of Crime Victim's Compensation programs, and others caring for sexual assault survivors; specialists in HIV prevention planning, service delivery, policy and legislation; persons with HIV and their partners; administrators of pharmacy assistance programs; and managers of medical assistance programs, health insurance plans, and health systems.

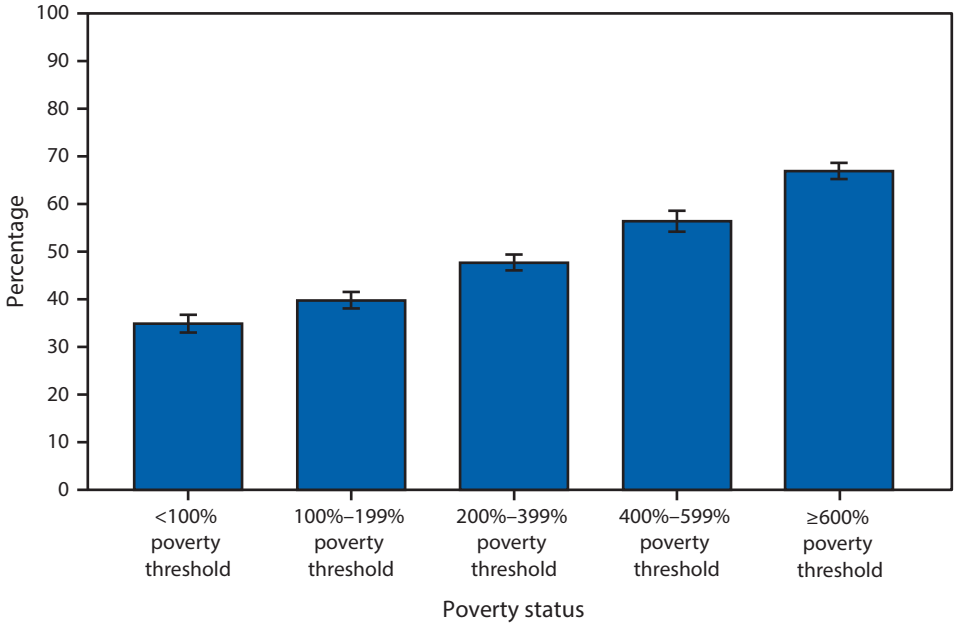
References

1. Smith DK, Grohskopf LA, Black RJ, et al. Antiretroviral postexposure prophylaxis after sexual, injection-drug use, or other nonoccupational exposure to HIV in the United States: recommendations from the U.S. Department of Health and Human Services. MMWR Recomm Rep 2005;54(No. RR-2). http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5402a1.htm
2. Kuhar DT, Henderson DK, Struble KA, et al. Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. Infect Control Hosp Epidemiol 2013;34:875–92. http://dx.doi.org/10.1086/672271

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Who Met Federal Guidelines for Aerobic Physical Activity,† by Poverty Status§ — National Health Interview Survey, United States, 2014¶



* With error bars indicating 95% confidence interval.
† Per U.S. Department of Health and Human Services 2008 Physical Activity Guidelines for Americans (http://www.health.gov/paguidelines/guidelines/default.aspx). Respondents were considered to be meeting aerobic activity guidelines if they reported moderate-intensity physical activity for ≥150 minutes leisure-time activity per week, vigorous-intensity physical activity for ≥75 minutes leisure-time activity per week, or an equivalent combination of moderate-intensity and vigorous-intensity leisure-time activity.
§ Poverty status is based on family income and family size using the 2013 U.S. Census Bureau poverty thresholds. Family income was imputed where missing.
¶ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population and are derived from the National Health Interview Survey sample adult component.

In 2014, the percentage of adults aged ≥18 years who met federal guidelines for aerobic physical activity increased as family income increased. The percentage of adults aged ≥18 years who met federal guidelines for aerobic physical activity ranged from 34.8% for those with family incomes <100% of the poverty level to 66.8% for those with family incomes ≥600% of the poverty level.

Source: National Health Interview Survey data, 2014. http://www.cdc.gov/nchs/nhis.htm.

Reported by: LaJeana Hawkins, MPH, LDHawkins@cdc.gov, 301-458-4611; Mark Montgomery, MS; Deepthi Kandi.

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*'s free subscription page at *http://www.cdc.gov/mmwr/mmwrsubscribe.html*. Paper copy subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone 202-512-1800.

Readers who have difficulty accessing this PDF file may access the HTML file at *http://www.cdc.gov/mmwr/index2016.html*. Address all inquiries about the *MMWR* Series, including material to be considered for publication, to Executive Editor, *MMWR* Series, Mailstop E-90, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30329-4027 or to mmwrq@cdc.gov.

ISSN: 0149-2195 (Print)