Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 63 / No. 46
November 21, 2014

National Diabetes Month — November 2014

November is National Diabetes Month. In the United States, about 29 million persons have diabetes, including 8 million who do not know they have it (*1*). In addition, about 86 million adults have prediabetes, putting them at increased risk for developing type 2 diabetes, heart disease, and stroke, and only 11% know they have it (*1,2*). However, persons with diabetes can take steps to control the disease and prevent complications, and those with prediabetes can prevent or delay the onset of type 2 diabetes through weight loss and physical activity (*3*). A recent study showed that after decades of continued growth in the rate of new cases of diagnosed diabetes, the rate of increase in new cases might have leveled off (*4*).

CDC and its partners support programs to prevent and control diabetes. CDC's National Diabetes Prevention Program promotes community-based lifestyle change programs for persons at risk for type 2 diabetes throughout the United States (*5*). CDC's Native Diabetes Wellness Program supports health promotion and prevention of type 2 diabetes in American Indian/Alaska Native communities. The National Diabetes Education Program, jointly sponsored by CDC and the National Institutes of Health, provides tools and resources to help organizations and individuals address diabetes in their communities, health care practices, and businesses.

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Diabetes Self-Management Education and Training Among Privately Insured Persons with Newly Diagnosed Diabetes — United States, 2011–2012

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Diabetes is a complex chronic disease that requires active involvement of patients in its management (*1*). Diabetes self-management education and training (DSMT), "the ongoing process of facilitating the knowledge, skill, and ability necessary for prediabetes and diabetes self-care," is an important component of integrated diabetes care (*2*). It is an intervention in which patients learn about diabetes and how to implement the self-management that is imperative to control the disease.

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The curriculum of DSMT often includes the diabetes disease process and treatment options; healthy lifestyle; blood glucose monitoring; preventing, detecting and treating diabetes complications; and developing personalized strategies for decision making (*2*). The American Diabetes Association recommends providing DSMT to those with newly diagnosed diabetes (*1*), because data suggest that when diabetes is first diagnosed is the time when patients are most receptive to such engagement (*3*). However, little is known about the proportion of persons with newly diagnosed diabetes participating in DSMT. CDC analyzed data from the Marketscan Commercial Claims and Encounters database (Truven Health Analytics) for the period 2009–2012 to estimate the claim-based proportion of privately insured adults (aged 18–64 years) with newly diagnosed diabetes who participated in DSMT during the first year after diagnosis. During 2011–2012, an estimated 6.8% of privately insured, newly diagnosed adults participated in DSMT during the first year after diagnosis of diabetes. These data suggest that there is a large gap between the recommended guideline and current practice, and that there is both an opportunity and a need to enhance rates of DSMT participation among persons newly diagnosed with diabetes.

The Marketscan private insurance database includes data from both the employer and health plans that cover active employees, their spouses, and dependents. The database contains fully adjudicated and paid claims for millions of enrollees (e.g., approximately 52 million in 2011), including patient-level enrollment and inpatient, outpatient, and prescription drug claims. Persons were assigned a diagnosis of diabetes using the following algorithm: 1) having at least two outpatient claims ≥30 days apart coded for diabetes as a primary or secondary diagnosis (*International Classification of Diseases, Ninth Revision, Clinical Modification* codes 250x), 2) having received prescriptions for diabetes medications, either oral agents or insulin (therapeutic class codes 172–174), or 3) having at least one inpatient admission with diabetes as a primary or secondary diagnosis. Persons were classified as being newly diagnosed if they had diabetes in 2011 but not in 2010 and 2009. For inclusion in the study, persons were required to be continuously enrolled in 2009, 2010, and 2011 to minimize misclassification of persons with existing diabetes as newly diagnosed. Furthermore, they had to be continually enrolled for at least 12 months post-diagnosis to consistently capture DSMT participation during the first year after diagnosis. They were also required to have prescription drug coverage to ensure the accurate classification of antiglycemic medication use.

DSMT participation was defined as having filed at least one DSMT claim (G0108, G0109, S9140, S9141, S9145, S9455, S9460, and S9465) within 12 months after diagnosis of diabetes.* DSMT participation was estimated overall and for subgroups by age, sex, oral diabetes medication prescription, insulin prescription, insurance type (fee-for-service or capitated health plan), metropolitan statistical area, and region

*Additional information available at http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/reimbursement_tips_2009.pdf.

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 2014;63:[inclusive page numbers].

of residence, using multivariate logistic regression. Predicted margins were reported as adjusted rates of DSMT participation in these subgroups, adjusting simultaneously for the other covariates. The difference in adjusted rates of DSMT participation between subgroups was tested using t-tests; results were considered statistically significant if p<0.05.

A total of 95,555 persons with newly diagnosed diabetes were identified. Among them, 25.6% were not prescribed any antiglycemic medications, and 6.8% were prescribed insulin (with or without oral medication) (Table 1). During 2011–2012, 6.8% of persons with newly diagnosed diabetes participated in DSMT within 12 months of diagnosis.

The adjusted rates of participation in DSMT were slightly higher among older (aged 45–64 years) compared with younger adults (aged 18–44 years) (7.2% versus 5.9%, p<0.001); those prescribed insulin for glycemic control compared with those prescribed oral agents only (14.2% versus 6.7%, p<0.001) or not prescribed any antiglycemic medication (14.2% versus 5.1%, p<0.001); those enrolled in fee-for-service health plans compared with those in capitated health plans (7.0% versus 6.0%, p<0.001); those residing in a metropolitan statistical area compared with those outside (7.1% versus 5.5%, p<0.001); and those residing in the North Central region (9.2%) compared with those residing in other regions (5.7%–6.9%, p<0.001 for each) (Table 2). For each subgroup, the adjusted rate of participating in a DSMT ranged from 5.1% to 14.2%.

TABLE 1. Selected characteristics of persons enrolled in a study assessing participation in diabetes self-management education and training* — United States, 2011–2012

Characteristic	%
Age group (yrs)	
18–44	29.0
45–64	71.0
Female	53.4
Diabetes treatment	
Insulin (with or without oral antiglycemic medication)	6.8
Oral antiglycemic medication only	67.6
Without antiglycemic medication	25.6
Health plan	
Fee-for-service	81.2
Capitated	18.8
Living in an MSA	84.1
U.S. Census region	
Northeast	11.7
North Central	23.3
South	47.5
West	17.5

Abbreviation: MSA = metropolitan statistical area.
Source: Marketscan Commercial Claims and Encounters database (Truven Health Analytics).
* Enrollees 1) were adults aged 18–64 years with diabetes newly diagnosed in 2011; 2) were continuously enrolled in a private health plan in 2009, 2010, and 2011, and during the year after diagnosis of diabetes; and 3) had prescription drug coverage.

Discussion

DSMT helps patients to improve glycemic control, which could reduce the risk for diabetes complications, hospitalizations, and health care costs (*4*–*6*). The findings in this report indicate that DSMT was substantially underused among persons with newly diagnosed diabetes even in an insured population with private health insurance. Fewer than 7% of persons received DSMT within 1 year after diagnosis with diabetes. Although there were differences in the rates of DSMT participation across subgroups, no subgroup of persons with newly diagnosed diabetes reached even a 15% participation rate.

In this report, DSMT classification was based on actual claims for DSMT received in the health care setting. Another analysis using cross-sectional commercial and Medicare claims-based databases also reported low rates of participation in DSMT and nutrition therapy in all enrollees with diagnosed diabetes (7% among those with private insurance and 4%

TABLE 2. Adjusted percentage* of study enrollees (N = 95,555)† participating in diabetes self-management education and training within 1 year after being diagnosed with diabetes, by selected characteristics — United States, 2011–2012

Characteristic	%
Overall	**6.8**
Age group (yrs)	
18–44	5.9
45–64	7.2
Sex	
Male	6.8
Female	6.8§
Diabetes treatment	
Insulin (with or without oral antiglycemic medication)	14.2
Oral antiglycemic medication only	6.7
Without antiglycemic medication	5.1
Health plan	
Fee-for-service	7.0
Capitated	6.0
Place of living	
MSA	7.1
Non-MSA	5.5
U.S. Census region	
Northeast	6.9
North Central	9.2
South	5.7
West	6.5

Abbreviation: MSA = metropolitan statistical area.
Source: Marketscan Commercial Claims and Encounters database (Truven Health Analytics).
* Predicted margins adjusted simultaneously for age, sex, medication use, insurance type, MSA, and U.S. Census region. Comparison of rates between subgroups and the reference group are all statistically significant (p<0.001), except those designated as not significant (p>0.05). Reference groups: aged 18–44 years, male, insulin prescription, fee-for-service plan, MSA, and North Central region.
† Enrollees 1) were adults aged 18–64 years with diabetes newly diagnosed in 2011; 2) were continuously enrolled in a private health plan in 2009, 2010, and 2011, and during the year after diagnosis of diabetes; and 3) had prescription drug coverage.
§ Not statistically significant (p>0.05).

What is already known on this topic?

Diabetes self-management education and training (DSMT) is an important part of clinical management of diabetes that helps persons with diabetes stay healthy. The American Diabetes Association recommends persons with diabetes receiving DSMT at diagnosis and as needed thereafter. Diabetes education is associated with increased use of primary and preventive services and lower use of acute, inpatient hospital services.

What is added by this report?

Among persons aged 18–64 years with newly diagnosed diabetes who had private insurance coverage, the rate of participation in DSMT during the first year after diagnosis was very low (6.8%). The rate was <15% among all subgroups examined.

What are the implications for public health practice?

Health system level interventions such as improving access to DSMT, along with personal level interventions such as behavioral change strategies, might be considered to increase the rate of DSMT participation among persons with newly diagnosed diabetes.

among those with Medicare coverage) (*6*). Furthermore, the age-adjusted percentage of adults aged ≥18 years with diagnosed diabetes reported ever having attended a diabetes education class was 57.4% in 2010 (*7*), falling short of the *Healthy People 2020* objective D-14: increase the proportion of persons with diagnosed diabetes who receive formal diabetes education to 62.5%.[†]

Lack of insurance coverage has previously been identified as a barrier to DSMT participation (*8*). Based on previous research, 44 states[§] required private insurance to cover DSMT, but many plans still did not cover it, and many others required a copayment (*9*). An additional health system barrier might be the requirement for physician referral for DSMT (*8*). There are also individual-level barriers, such as personal perceptions about diabetes, avoidance behaviors, and lack of awareness that DSMT exists (*8*).

Low DSMT participation among persons with newly diagnosed diabetes is a concern. Although some persons might have participated in medical nutrition therapy, from which they receive nutrition recommendations and interventions, others might have limited knowledge about the dietary aspects of diabetes management (*1*). For those not prescribed medication for glycemic management, failure to participate in DSMT could mean that their diabetes remains essentially untreated. For those prescribed insulin, lack of participation in DSMT could reduce the likelihood of adequate blood glucose management (*1*). The American Medical Association–convened Physician Consortium for Performance Improvement and the National Committee for Quality Assurance have proposed additional quality indicators for diabetes care, including rates of referral to DSMT for patients newly diagnosed with diabetes and rates of referral to DSMT for patients with newly prescribed insulin.[¶]

The findings in this report are subject to at least four limitations. First, the study population was limited to persons aged 18–64 years who were covered by employer-provided health insurance in the Marketscan database and had continuous coverage for ≥3 years. Therefore, these findings might not be generalizable to other populations, such as those aged ≥65 years and persons with other types of health insurance coverage or without health insurance (*6*). Second, participation in DSMT was defined as having had at least one claim filed for DSMT. Some persons might have received DSMT that was not covered by insurance (e.g., through a worksite wellness program). Third, multiple DSMT visits during the first year after diagnosis of diabetes are often recommended in clinical guidelines; whether or not persons participating in DSMT completed all the recommended hours is unknown. Finally, claims data might include some misclassification and misreporting, and the claim-based algorithm to define diabetes patients might have underestimated the number of persons with diagnosed diabetes. However, studies have shown that claims-based data adequately identify most persons with diagnosed diabetes (*10*).

The finding of low rates of participation in DSMT among privately insured adults with newly diagnosed diabetes underscores the need to identify specific barriers to access and participation in DSMT along with strategies to overcome these barriers. CDC is working to achieve *Healthy People 2020* objective D-14. In 2013, CDC administered funds to state health departments to implement DSMT strategies through the 5-year cooperative agreement: State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity, and Associated Risk Factors and Promote School Health. The DSMT strategy under this agreement focuses on increasing use by persons with diabetes of DSMT programs recognized by the American Diabetes Association or accredited by the American Association of Diabetes Educators, through increased access, physician referrals, and reimbursement.

[†] Additional information available at https://www.healthypeople.gov/2020/topics-objectives/topic/diabetes/objectives.

[§] Additional information available at http://www.ncsl.org/research/health/diabetes-health-coverage-state-laws-and-programs.aspx.

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Progress Toward Global Eradication of Dracunculiasis — January 2013–June 2014

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Dracunculiasis (Guinea worm disease) is caused by *Dracunculus medinensis*, a parasitic worm. Approximately 1 year after a person acquires infection from contaminated drinking water, the worm will emerge through the skin, usually on the lower limb. Pain and secondary bacterial infection can cause temporary or permanent disability that disrupts work and schooling. In 1986, the World Health Assembly called for dracunculiasis elimination (*1*). The global Guinea Worm Eradication Program, supported by The Carter Center, World Health Organization (WHO), UNICEF, CDC, and other partners, began assisting ministries of health of countries in which dracunculiasis is endemic in meeting this goal. At that time, an estimated 3.5 million cases occurred each year in 20 countries in Africa and Asia (*1,2*). This report updates published (*3–5*) and unpublished surveillance data reported by ministries of health and describes progress toward dracunculiasis eradication. A total of 148 cases were reported in 2013 from five countries (in order of prevalence: South Sudan, Chad, Mali, Ethiopia, and Sudan) compared with 542 cases in 2012 from four countries (South Sudan, Chad, Mali, and Ethiopia). The disease remains endemic in four countries in 2014 (South Sudan, Chad, Mali, and Ethiopia), but the overall incidence is falling faster in 2013 compared with 2012 (by 73%) and continues to fall faster in the first 6 months of 2014 (by 71%) compared with the same period in 2013. Failures in surveillance and containment, lack of clean drinking water, insecurity in Mali and parts of South Sudan, and an unusual epidemiologic pattern in Chad (*6*) are the main remaining challenges to dracunculiasis eradication.

Because the lifecycle of *D. medinensis* is complex, its transmission can be interrupted using several strategies (*4*). Dracunculiasis can be prevented with four main interventions: 1) educating residents in communities where it is endemic, and particularly persons from whom worms are emerging, to avoid immersing affected body parts in sources of drinking water, 2) filtering potentially contaminated drinking water through a cloth filter, 3) treating potentially contaminated surface water with the insecticide temephos (Abate), and 4) providing safe drinking water from bore-hole or hand-dug wells (*7*). Containment of transmission,* is achieved through four complementary measures: 1) voluntary isolation of each patient to prevent contamination of drinking water sources, 2) provision of first aid, 3) manual extraction of the worm, and 4) application of occlusive bandages.

Countries enter the WHO precertification stage of eradication after completing 1 full year without reporting any indigenous† cases (*D. medinensis* has approximately a 1-year incubation period [range = 10–14 months]) (*7*). A case of dracunculiasis is defined as infection occurring in a person exhibiting a skin lesion or lesions with emergence of one or more Guinea worms. Each infection is counted as a case only once during a calendar year. An imported case is an infection resulting from ingestion of contaminated water from a source identified through patient interviews and epidemiologic investigation in a place (i.e., another country or village within the same country) other than in the community where the patient is detected and reported. Three countries where transmission of dracunculiasis was previously endemic (Ghana, Kenya, and Sudan) are in the precertification stage of eradication.

In each country affected by dracunculiasis, a national eradication program receives monthly reports of cases from each village that has endemic transmission. Reporting rates are calculated by dividing the number of villages with endemic dracunculiasis that report each month by the total number of villages with endemic disease. All villages with endemic

* Transmission from a patient with dracunculiasis is contained if all of the following conditions are met: 1) the infected patient is identified before or <24 hours after worm emergence; 2) the patient has not entered any water source since the worm emerged; 3) a village volunteer or other health care provider has managed the patient properly, by cleaning and bandaging the lesion until the worm has been fully removed manually and by providing health education to discourage the patient from contaminating any water source (if two or more emerging worms are present, transmission is not contained until the last worm is removed); 4) the containment process, including verification of dracunculiasis, is validated by a supervisor within 7 days of emergence of the worm; and 5) temephos is used if there is any uncertainty about contamination of sources of drinking water, or if a source of drinking water is known to have been contaminated. All of these criteria must be achieved for each emerged worm for the case to be considered contained.

† An indigenous case of dracunculiasis is defined as an infection occurring in a person exhibiting a skin lesion or lesions with emergence of one or more Guinea worms in a person who had no history of travel outside his or her residential locality during the preceding year.

dracunculiasis are kept under active surveillance, with daily searches of households for persons with signs and symptoms suggestive of dracunculiasis. These searches are conducted to ensure that detection occurs within 24 hours of worm emergence so that patient management can begin to prevent contamination of water sources. Villages in which endemic transmission of dracunculiasis is interrupted (i.e., zero cases reported for ≥12 consecutive months) also are kept under active surveillance for 3 consecutive years.

WHO certifies a country free from dracunculiasis after that country maintains adequate nationwide surveillance for ≥3 consecutive years and demonstrates that no cases of indigenous dracunculiasis occurred during that period. As of the end of 2013, WHO had certified 197 countries, areas, and territories as free from dracunculiasis (*3*). Nine countries remain to be certified: four countries where it is currently endemic (South Sudan, Chad, Mali, and Ethiopia), three countries in the precertification stage (Ghana, Kenya, and Sudan), and two countries never known to have had endemic dracunculiasis (Angola and the Democratic Republic of the Congo).

Although the 1991 and 2004 World Health Assembly goals to eradicate dracunculiasis globally in 1995 and 2009, respectively, were not achieved (*7,8*), considerable progress toward eradication has been made since 1986 in reducing the annual number of reported cases. This progress continued with a 73% decrease in cases between 2012 (542 cases) and 2013 (148) followed by a 71% decrease in cases during the first 6 months of 2014 (27) compared with the same period in 2013 (92). This 71% decrease in cases during the first half of 2014 compared with the same period in 2013 did include an increase in cases in Chad (from five cases in 2013 to six cases in 2014), but cases decreased in Ethiopia, Mali, and South Sudan. There also was a 29% reduction in the number of villages in these four countries reporting cases during January–June 2014 (20 villages) compared with January–June 2013 (28).

Surveillance is a challenge everywhere dracunculiasis exists. Of particular concern, surveillance for dracunculiasis remains constrained in most dracunculiasis-affected areas of Mali because of insecurity since March 2012. CDC tested 50 specimens during January 2013–June 2014 from suspected cases in humans in seven countries in which dracunculiais is or was endemic; 22 (44%) specimens were determined to be *D. medinensis*.

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South Sudan. The 10 southern states of the former Sudan became the independent Republic of South Sudan in July 2011. The South Sudan area reported all of the indigenous cases since 2002, except for three cases detected in Sudan in 2013. The South Sudan Guinea Worm Eradication Program reported 113 cases in 2013, of which 76 (67%) were contained (Table 1), which was a reduction of 78% from the 521 cases reported in 2012. During January–June 2014, the South Sudan Guinea Worm Eradication Program reported a provisional total of 19 cases (79% contained), from 13 villages, compared with 74 cases (70% contained) reported from 52 villages in January–June 2013; a reduction of 74% in cases and 75% in the number of villages reporting cases (Table 2). South Sudan reported zero cases during November 2013–February 2014. Of the cases reported in the first 6 months of 2014, 95% were from Kapoeta East County (in Eastern Equatoria State), where failure to repair a key bridge that collapsed in May 2012 made delivery of supplies more complicated and costly. As previously described (*4*), movements of persons along multiple routes for seasonal activities such as livestock grazing and farming as well as sporadic insecurity created during interethnic cattle raiding and other reasons have presented unusually complex challenges to this program.

A severe political crisis in December 2013 disrupted program operations when all expatriate staff assisting the program were evacuated from the country for several weeks, although most national staff continued to work in the areas with highest prevalence. However, the coverage with interventions remains high despite the challenges (Table 1). In April 2014, the commissioner of Health of Eastern Equatoria State personally launched South Sudan's cash reward for reporting a confirmed case of dracunculiasis (500 South Sudanese pounds, or about US $125), during a 10-day tour of dracunculiasis-affected villages.

Chad. After a decade with no reported cases, Chad reported 10 cases in 2010, and dracunculiasis was declared endemic in Chad in 2012 after indigenous cases of dracunculiasis were confirmed over 3 consecutive years (*9*). Chad reported 14 cases in 10 villages in 2013, and six cases in six villages during January–June 2014. The 14 cases reported in 2013 is an increase from the 10 cases reported in 2012; and the six cases reported during January–June 2014 is increase from the five cases reported during January–June 2013. Overall, 57% of the cases reported in 2013 and 67% of the cases reported in the first 6 months of 2014 were contained. Only one of the 10 villages that reported a case in 2013 and two of the six villages that reported a case during January–June 2014 had reported a case before.

Since 2012, more dogs than humans have had emerging Guinea worms in Chad. This has not happened in any other country during the eradication campaign. Since April 2012, 49 worm specimens obtained from dogs were morphologically and or genetically confirmed to be *D. medinensis* at CDC (WHO Collaborating Center, unpublished data, 2014[§]).

[§] CDC is the WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis.

TABLE 1. Number of reported dracunculiasis cases, by country and local interventions — worldwide, 2013

Country	Reported cases: Indigenous in 2013	Reported cases: Imported in 2013*	Reported cases: Contained during 2013 (%)	Change in indigenous cases in villages under surveillance during the same period in 2012 and 2013 (%)	Villages under active surveillance in 2013: No.	Reporting monthly (%)	Reporting ≥1 case	Reporting only imported cases†	Reporting indigenous cases
South Sudan	113	0	(67)	(-78)	6,682	(100)	79	40	39
Mali	11	0	(64)	(57)	101	(85)	8	0	8
Chad	14	0	(57)	(40)	703	(100)	9	0	9
Ethiopia	7	0	(57)	(75)	72	(93)	5	1	4
Sudan	3		(100)						1
Total	**148**	**0**	**(66)**	**(-73)**	**7,558**	**(99)**	**101**	**41**	**61**

See table footnotes below.

TABLE 1. (*Continued*) Number of reported dracunculiasis cases, by country and local interventions — worldwide, 2013

Country	Status of interventions in endemic villages in 2013: Endemic villages 2012–2013	Reporting monthly§ (%)	Filters in all households§ (%)	Using temephos§ (%)	≥1 source of safe water§ (%)	Provided health education§ (%)
South Sudan	106	(100)	(98)	(96)	(33)	(97)
Mali¶	8	(75)	(100)	(75)	(50)	(75)
Chad	2	(100)	(100)	(50)	(50)	(100)
Ethiopia	2	(100)	(100)	(100)	(100)	(100)
Sudan	0					
Total	**118**	**(98)**	**(98)**	**(94)**	**(36)**	**(96)**

* Imported from another country.
† Imported from another country or from another in-country disease-endemic village.
§ The denominator is the number of villages/localities where the program applied interventions during 2013–2014.
¶ Guinea Worm Eradication Program operations (supervision, surveillance, and interventions) that were interrupted in Mali's Kidal, Gao, and Timbuktu regions as a result of insecurity beginning in April 2012, gradually improved during 2013–2014, except in Kidal region, where insecurity continues to constrain program operations.

Moreover, genetic testing to compare whether the worms obtained from humans and those obtained from dogs were *D. medinensis* confirmed that they were undistinguishable (*6*). During November–December 2013, after five human cases (none contained) were discovered in Sarh district (Moyen Chari Region), an area under passive surveillance, The Carter Center expanded its assistance and began implementing active surveillance in that district. The working hypothesis, based on biologic, environmental, and epidemiologic investigations by CDC and The Carter Center is that the cases in humans and dogs are associated with an intense domestic and commercial fishing industry along the Chari River (where nearly all the cases have occurred) and involve a fish that serves as a paratenic host (an intermediate host in which no development of the parasite occurs). New cases occur when inadequately cooked fish are consumed by humans and when raw fish or fish entrails are consumed by dogs (*6*).

TABLE 2. Number of reported indigenous dracunculiasis* cases, by country — worldwide, January 2012–June 2014

Country	2012	2013	1-yr change (%)	January–June 2013*	January–June 2014	6-month change (%)	Cases contained during January–June 2014 (%)
South Sudan	521	113	(-78)	74	19	(-74)	(79)
Mali†	7	11	(+57)	4	0	(-100)	
Chad	10	14	(+40)	5	6	(+20)	(67)
Ethiopia	4	7	(+75)	7	2	(-71)	(100)
Sudan		3		2	0	(-100)	
Total	**542**	**148**	**(-73)**	**92**	**27**	**(-71)**	**(78)**

* In 2012, three cases were imported into Niger from Mali and are included in Mali's total. These persons were residents in Mali the preceding year and Niger interrupted transmission of dracunculiasis in 2008. No reports of cases imported from one country to another were reported during January–June 2014.
† Guinea Worm Eradication Program operations (supervision, surveillance, and interventions) that were interrrupted in Mali's Kidal, Gao and Timbuktu regions as a result of insecurity beginning in April 2012, gradually improved during 2013–2014, except in Kidal region, where insecurity continues to constrain program operations.

What is already known on this topic?

The number of new cases of dracunculiasis (Guinea worm disease) occurring worldwide each year has decreased from an estimated 3.5 million in 1986, when the World Health Assembly declared global elimination as a goal, to 148 in 2013.

What is added by this report?

The number of dracunculiasis cases reported worldwide in 2013 declined by 73% compared with 2012, and by 71% during January–June 2014 compared with January–June 2013. Transmission remains endemic in four countries, with South Sudan accounting for 70% of all reported cases during January–June 2014.

What are the implications for public health practice?

Although earlier target dates for global dracunculiasis eradication were missed, progress has accelerated, and eradication is likely within the next year or two if disruption of program operations caused by insecurity in Mali can be minimized.

Chad's Guinea Worm Eradication Program and its partners continue to implement standard intervention practices in 72 priority villages at risk (Table 1). In October 2013, the program began promoting new educational messages to educate residents about proper cooking of fish and about the need to prevent dogs from eating raw fish and fish entrails. Temephos usage is constrained by the extremely large lagoons and impoundments used for fishing and as sources of drinking water. Investigations are under way to try to develop methods to isolate and treat water entry points at the end of paths leading from communities to water sources, which are routinely used by residents, and which have been identified during epidemiologic investigations as contaminated by a patient with GWD or by a dog with Guinea worm.

Mali. Mali's Guinea worm eradication program reported 11 indigenous cases in eight villages in 2013, an increase from the seven cases reported in 2012. Seven of the 11 cases were contained. Mali reported no cases during January–June 2014, compared with four cases (one contained) reported during the same period of 2013. In all, 85 villages were under active surveillance during January–June 2014. Cases in 2013 were reported from districts in Gao, Kidal, Mopti, and Timbuktu regions, where surveillance was still inadequate following insecurity in March 2012, although security improved somewhat in Gao, Mopti, and Timbuktu regions during January–June 2014. Médecins du Monde (Belgium) and Norwegian Church Aid are assisting the program in Kidal in 2014.

Ethiopia. Ethiopia reported seven cases in 2013. Four of these cases were contained (one each in January, April, May, and June). The seven cases reported in 2013 were an increase from the four cases reported in 2012. After 11 consecutive months with no cases, the program reported two cases in June 2014, which is a reduction from the seven cases reported during January–June 2013. The source of both cases in 2014 is uncertain. Since October 2013, at the request of the government, The Carter Center expanded its assistance for active surveillance to include all 79 villages in Abobo district and 22 villages in Itang district, in addition to all 72 villages in Gog district, which were already under active surveillance. For several years all cases have occurred in Gambella Region, where the government and WHO have now assigned Guinea worm surveillance officers in all Guinea worm-free districts.

Sudan. Sudan reported a small outbreak of two cases of Guinea worm disease in June 2013 and one case in September 2013. All three cases occurred at Kafia Kingi village in South Darfur, all were contained, and all patients were members of the same family. Kafia Kingi and four nearby villages at risk were placed under active surveillance and provided with health education, filters, and temephos interventions. Sudan reported no cases in January–June 2014. Dracunculiasis is not considered to be endemic in Sudan, and the country is in the precertification stage of eradication.

Discussion

Cases reported in the global Guinea Worm Eradication Program reached a historic low in 2013, and based on current trends, fewer than 100 cases are expected to be reported in 2014. In December 2013, Nigeria was certified as free from dracunculiasis transmission—a notable milestone as Nigeria reported more cases of dracunculiasis than any other country during 1988–2008. Despite significant challenges, South Sudan's Guinea worm eradication program is on track to eradicate the disease. The sparse, sporadic infection of humans and the unprecedented number of infected dogs in Chad are a new challenge requiring additional interventions that are currently under study.

Other challenges for governments and partners include 1) failures in surveillance and containment (e.g., missed cases, unexplained sources of cases, and uncontained cases), 2) establishment and maintenance of surveillance in dracunculiasis-free areas of all countries in which the disease still occurs or was recently eliminated, and 3) providing clean drinking water quickly to as many targeted villages as possible. Finally, insecurity in parts of Mali is now the main barrier to complete eradication of dracunculiasis.

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Global Routine Vaccination Coverage, 2013

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In 1974, the World Health Organization (WHO) established the Expanded Program on Immunization to ensure that all children have access to routinely recommended vaccines (*1*). Since then, global coverage with the four core vaccines (Bacille Calmette-Guérin vaccine [for protection against tuberculosis], diphtheria-tetanus-pertussis vaccine [DTP], polio vaccine, and measles vaccine) has increased from <5% to ≥84%, and additional vaccines have been added to the recommended schedule. Coverage with the third dose of DTP vaccine (DTP3) by age 12 months is a key indicator of immunization program performance. Estimated global DTP3 coverage has remained at 83%–84% since 2009, with estimated 2013 coverage at 84%. Global coverage estimates for the second routine dose of measles-containing vaccine (MCV2) are reported for the first time in 2013; global coverage was 35% by the end of the second year of life and 53% when including older age groups. Improvements in equity of access and use of immunization services will help ensure that all children are protected from vaccine-preventable diseases.

DTP3 coverage by age 12 months is a major indicator of immunization program performance; coverage with other vaccines, including the third dose of polio vaccine and the first dose of measles-containing vaccine is also assessed. Vaccination coverage is calculated as the percentage of persons in a target age group who received a vaccine dose. Administrative coverage is the number of vaccine doses administered to those in a specified target age group divided by the estimated target population. Countries report administrative coverage annually to WHO and the United Nations Children's Fund (UNICEF) (*2*). Vaccination coverage surveys estimate vaccination coverage by visiting a representative sample of households with children in a specified target age group (e.g., 12–23 months). Dates of vaccination are transcribed from the child's home-based record or are recorded based on caregiver recall. WHO and UNICEF derive national coverage estimates through an annual country-by-country review of all available data, including administrative and survey-based coverage. As new data are incorporated, revisions of past coverage estimates (*3,4*) and updates are published on their websites (*5,6*). This report is based on WHO and UNICEF estimates of vaccination coverage.

Estimated global DTP3 coverage among children aged <12 months in 2013 was 84%, ranging from 75% in the WHO African Region to 96% in the Western Pacific and European regions, and representing 111.8 million vaccinated children (Table 1). Approximately 21.8 million eligible children did not complete the 3-dose series; among them, 12.2 million (56%) did not receive the first DTP dose, and 9.6 million (44%) started, but did not complete, the 3-dose series. Estimated global coverage with Bacille Calmette-Guérin vaccine, the third dose of polio vaccine, and the first dose of measles-containing vaccine were 90%, 84%, and 84%, respectively. During 2013, a total of 129 of 194 WHO member states achieved ≥90% national DTP3 coverage, and 56 achieved ≥80% DTP3 coverage in every district. DTP3 coverage was 80%–89% in 31 countries, 70%–79% in 16 countries, and <70% in 18 countries.

Among the 21.8 million children who did not receive 3 DTP doses during the first year of life, 10.9 million (50%) lived in three countries (India [31%], Nigeria [13%] and Pakistan [6%]); 14.8 million (68%) lived in 10 countries (Figure). An estimated 12.2 million (56%) incompletely vaccinated children did not receive the first DTP dose, and nearly 9.6 million (44%) started but did not complete the 3-dose series.

Additional vaccines are increasingly being introduced into national immunization programs. By the end of 2013, hepatitis B vaccine was included in the routine immunization (RI) schedule in 183 (94%) countries; in 93 (58%) countries, a birth dose administered within 24 hours of birth was included to prevent perinatal hepatitis B virus transmission. Worldwide (including countries that have not introduced the vaccine), coverage with 3 doses of hepatitis B vaccine was 81%, and by region ranged from 74% in the South-East Asia Region to 92% in the Western Pacific Region (Table 1). A hepatitis B vaccine birth dose was given to 38% of newborns globally, ranging from 11% in the African Region to 79% in the Western Pacific Region. Rubella vaccine as part of the RI schedule has been introduced in 137 (71%) countries, with an estimated coverage of 44% globally. Coverage with 3 doses of *Haemophilus influenzae* type b vaccine, which had been introduced into 189 (97%) countries* by 2013, was 52% globally, ranging from 18% in the Western Pacific Region to 90% in the Americas Region. By 2013, rotavirus vaccine was introduced in 52 (27%) countries, and pneumococcal conjugate vaccine (PCV) was introduced in 103 (53%) countries. Coverage with the completed rotavirus vaccination series (2 or 3 doses, depending on vaccine used) was 14% globally and

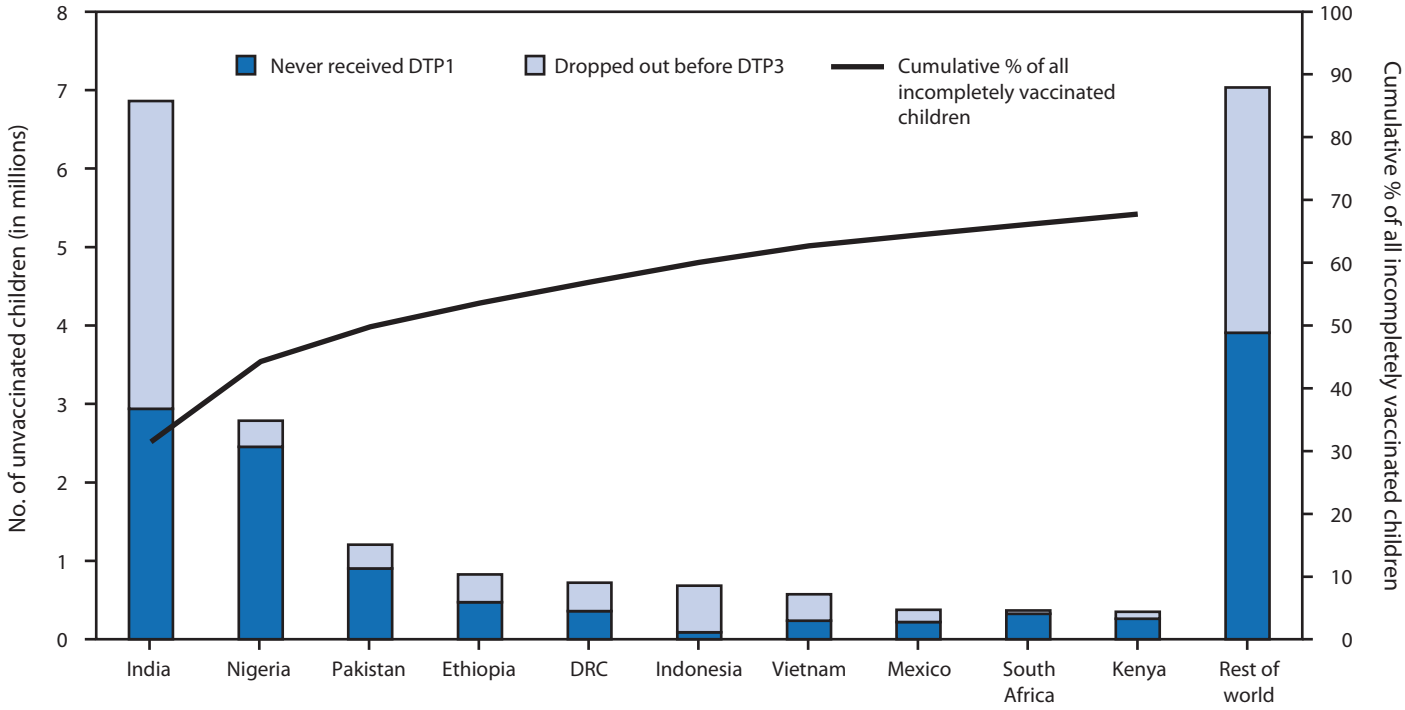
* Includes parts of Belarus, India, and Indonesia.

TABLE 1. Vaccination coverage, by vaccine and World Health Organization (WHO) region* — worldwide, 2013

WHO region	Vaccination coverage (%)									
	BCG	DTP3	Polio3	MCV1	MCV2	HepB BD	HepB3	Hib3	Rota last	PCV3
Total (worldwide)	**90**	**84**	**84**	**84**	**53**	**38**	**81**	**52**	**14**	**25**
African	83	75	77	74	7	11	76	72	12	35
Americas	94	90	90	92	46	71	89	90	70	77
Eastern Mediterranean	88	82	82	78	65	24	83	60	22	36
European	95	96	96	95	82	41	81	83	3	43
South-East Asia	90	77	76	78	53	26	74	27	0	0
Western Pacific	97	96	97	97	92	79	92	18	4	1

Abbreviations: BCG = Bacille Calmette-Guérin; DTP3 = 3 doses of diphtheria-tetanus-pertussis vaccine; Polio3 = 3 doses of poliovirus vaccine; MCV1 = first dose of measles-containing vaccine; MCV2 = second dose of measles-containing vaccine; HepB BD = birth dose of hepatitis B vaccine; HepB3 = 3 doses of hepatitis B vaccine; Hib3 = 3 doses of *Haemophilus influenzae* type b vaccine; Rota last = last dose of rotavirus series; PCV3 = 3 doses of pneumococcal conjugate vaccine.
* Weighted regional average.

FIGURE. Estimated number of children who did not receive 3 doses of diphtheria-tetanus-pertussis vaccine (DTP3) during the first year of life among 10 countries with the largest number of incompletely vaccinated children and cumulative percentage of all incompletely vaccinated children worldwide accounted for by these 10 countries, 2013



Abbreviations: DTP1 = 1 dose of diphtheria-tetanus-pertussis vaccine; DRC = Democratic Republic of the Congo.

reached 70% in the Americas Region. Coverage with 3 doses of PCV was 25% globally and was highest (77%) in the Americas Region. MCV2 was included in the RI schedule in 148 (76%) countries; global coverage in 2013 was 53%.

MCV2 and booster doses for DTP and polio vaccine are administered during the second year of life or later. A total of 159 (82%) countries now have at least one vaccination in the RI schedule during the second year of life. The most common vaccines administered during these visits are MCV2 (57 countries), diphtheria-tetanus (DT)–containing boosters (105 countries), and polio vaccine boosters (78 countries) (Table 2).

Discussion

Although global coverage estimates for DTP3, Bacille Calmette-Guérin vaccine, the first dose of measles-containing vaccine, and the third dose of polio vaccine have increased substantially since the start of the Expanded Program on Immunization, coverage estimates for these vaccines have

TABLE 2. Number and percentage of member states with vaccination recommended in immunization schedule during the second year of life, by vaccine and World Health Organization (WHO) region — worldwide, 2013

WHO region	No. of member states (%)						
	Total no. of member states	MCV2	DT-containing vaccine	Polio	PCV	Other vaccines	≥1 health care visit during second year
Total (worldwide)	**194**	**57 (29)**	**105 (54)**	**78 (40)**	**14 (7)**	**40 (21)**	**159 (82)**
African	47	11 (23)	10 (21)	10 (21)	0	0	24 (51)
Americas	35	4 (11)	31 (89)	28 (80)	3 (9)	11 (31)	34 (97)
Eastern Mediterranean	21	15 (71)	16 (76)	15 (71)	3 (14)	5 (24)	20 (95)
European	53	8 (15)	36 (68)	20 (38)	4 (8)	18 (34)	49 (92)
South-East Asia	11	6 (55)	4 (36)	2 (18)	0	1 (9)	9 (82)
Western Pacific	27	13 (48)	8 (30)	3 (11)	4 (15)	5 (19)	23 (85)

Abbreviations: MCV1 = first dose of measles-containing vaccine; MCV2 = second dose of measles-containing vaccine; DT = diphtheria-tetanus; PCV = pneumococcal conjugate vaccine.

plateaued over the past 5 years (*7*). In 2012, the World Health Assembly endorsed the Global Vaccine Action Plan as a framework for strengthening RI systems. One of the Global Vaccine Action Plan's guiding principles is to improve equity in access and use of RI services. Nearly 70% of incompletely vaccinated children worldwide live in only 10 countries (50% live in only three countries), highlighting disparities among countries. Two thirds of countries achieved the Global Vaccine Action Plan target of 90% DTP3 coverage nationally, whereas less than one third achieved >80% DTP3 coverage in every district, highlighting coverage disparities within countries.

As immunization systems mature and additional vaccines are incorporated into vaccination schedules, inequity of RI services by age plays a greater role in discrepancies in immunity, and the importance of immunization platforms beyond the first year of life increases. The majority of countries in all WHO regions have incorporated at least one second-year vaccine into the RI schedule, ranging from 51% of countries in the African Region to 97% in the Americas Region (Table 2).

Strengthening the platform for RI services during the second year of life provides several benefits. First, a stronger platform can improve coverage with vaccines scheduled after age 12 months, such as MCV2 and DTP boosters. It also provides a foundation for the introduction of new vaccines anticipated to have scheduled doses during the second year of life, such as malaria vaccine (*8*). In addition, the second year of life platform provides an opportunity to catch up on vaccines missed during the first year. Findings of a recent modeling study suggest that expanding the age range at which children in Africa are eligible to receive the first dose of measles-containing vaccine could increase coverage substantially (*9*). Finally, an additional well child visit during the second year of life creates an opportunity to integrate RI services with other health interventions, such as vitamin A supplementation and presumptive treatment for intestinal helminths.

What is already known on this topic?

In 1974, the World Health Organization established the Expanded Program on Immunization to ensure that all children have access to routinely recommended vaccines. Since then, global coverage with the four core vaccines has increased from <5% to ≥84%, and additional vaccines have been added to the recommended schedule. Coverage with the third dose of diphtheria-tetanus-pertussis vaccine by age 12 months is a key indicator of immunization program performance.

What is added by this report?

Estimated global coverage with the third dose of diphtheria-tetanus-pertussis vaccine has remained at 83%–84% since 2009, with estimated 2013 coverage at 84%. Global coverage estimates for the second routine dose of a measles-containing vaccine are reported for the first time in 2013; global coverage was 35% by the end of the second year of life and 53% when including older age groups.

What are the implications for public health practice?

Improvements in equity of access and use of immunization services will help ensure that all children are protected from vaccine-preventable diseases.

Several barriers exist to implementation of a strong platform for vaccination in the second year of life. Implementation of policies to allow RI services beyond the first year of life requires training of health workers and improved vaccine forecasting by immunization program managers to accommodate the need for increased vaccine supply and minimize the likelihood of stock outages. In addition, challenges regarding monitoring need to be considered. For administrative coverage, population size estimates used might be less accurate for older cohorts than for birth cohorts. In coverage surveys, parents of older children are less likely to have home-based vaccination records and are more likely to have poor recall of vaccinations. Health messages can encourage parents to keep home-based records beyond the first year of life.

Enhancing the platform for vaccination in the second year of life should be part of a multifaceted approach to strengthening RI systems. Continued assurance of quality vaccine supply, improved awareness and demand for immunization services by the community, and improvement of delivery services to access hard-to-reach populations and minimize missed opportunities are still critical to improving vaccination coverage, especially in those countries that are home to the majority of incompletely vaccinated children.

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Progress Toward Poliomyelitis Eradication — Nigeria, January 2013–September 2014

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In 1988, the World Health Assembly resolved to interrupt wild poliovirus (WPV) transmission worldwide (*1*). By 2013, only three countries remained that had never interrupted WPV transmission: Afghanistan, Nigeria, and Pakistan. Since 2003, northern Nigeria has been a reservoir for WPV reintroduction into 26 previously polio-free countries. In May 2014, the World Health Organization declared the international spread of polio a Public Health Emergency of International Concern. Nigeria's main strategic goal is to interrupt WPV type 1 (WPV1) transmission by the end of 2014 (*2*), which is also a main objective of the Global Polio Eradication Initiative's Polio Eradication and Endgame Strategic Plan for 2013–2018 (*3*). This report updates previous reports (*4–6*) and describes polio eradication activities and progress in Nigeria during January 2013–September 30, 2014. Only six WPV cases had been reported in 2014 through September 30 compared with 49 reported cases during the same period in 2013. The quality of supplemental immunization activities (SIAs)* improved during this period; the proportion of local government areas (LGAs) within 11 high-risk states† with estimated oral poliovirus vaccine (OPV) campaign coverage at or above the 90% threshold increased from 36% to 67%. However, the number of reported circulating vaccine-derived poliovirus type 2 (cVDPV2) cases increased from four in 2013 to 21 to date in 2014, and surveillance gaps are suggested by genomic sequence analysis and continued detection of WPV1 by environmental surveillance. Interrupting all poliovirus circulation in Nigeria is achievable with continued attention to stopping cVDPV2 transmission, improving the quality of acute flaccid paralysis (AFP) surveillance, increasing vaccination coverage by strengthened routine immunization services, continuing support from all levels of government, and undertaking special initiatives to provide vaccination to children in conflict-affected areas in northeastern Nigeria.

* Mass campaigns conducted for a few days during which 1 dose of oral poliovirus vaccine is administered to all children aged <5 years, regardless of vaccination history. Campaigns can be conducted nationally or subnationally.

† Bauchi, Borno, Jigawa, Kaduna, Kano, Katsina, Kebbi, Niger, Sokoto, Yobe, and Zamfara.

Vaccination Activities

Routine immunization for infants and children in Nigeria includes vaccination with trivalent OPV (tOPV) at birth and at ages 6, 10, and 14 weeks. The 2013 Nigeria Demographic and Health Survey§ reported national coverage with 3 doses of trivalent oral polio vaccine (OPV3)¶ of children aged 12–23 months at 38.2% (*7*). OPV3 coverage estimates among the northern 11 high-risk states ranged from 2.6% for Sokoto to 43.7% for Kaduna.

During January 2013–September 2014, 24 SIAs were implemented. Three national SIAs used tOPV (the last one occurring in August 2014), two national SIAs used bivalent OPV (bOPV), and 19 subnational SIAs used bOPV, mostly in high-risk states. A major focus for SIA implementation has been in two transmission "zones": the "Kano zone," which includes LGAs (equivalent to districts) in the south of Kano as well as LGAs in northeastern Kaduna and northwestern Bauchi, and the "Borno/Yobe zone," which includes Borno and Yobe (*8*). In Kano, intensified SIA plans include statewide microplanning validated by walk-through and, consistent with national policy, responding to any new WPV as though it were an outbreak. During June–October, three outbreak response campaigns were implemented in response to each of the three most recent WPV1 cases detected in Kano, supplementing subnational SIAs.

In Borno and Yobe, the innovations being implemented to address challenges caused by insecurity include the use of "permanent health teams" comprised of women who deliver OPV to households within their own communities, transit-point vaccination, vaccination in camps for internally displaced persons, and "short-interval" SIAs that take advantage of transient

¶ DTP3 coverage used as surrogate for routine immunization coverage since reported OPV can include doses given during SIAs.

§ These routine immunization coverage estimates differ from administrative data presented in previous *MMWR* updates because these data come from the 2013 Nigeria Demographic and Health Survey. This survey was conducted using a nationally representative sample of 40,320 households and was designed to produce reliable estimates for key indicators at the national level as well as for urban and rural areas, each of the country's six geographic zones, and each of the 36 states and the Federal Capital Territory. More information on survey methodology available at http://dhsprogram.com/publications/publication-FR293-DHS-Final-Reports.cfm.

access to normally inaccessible areas. In June and August 2014, inactivated polio vaccine was included along with tOPV in SIAs conducted in 27 LGAs of Borno and Yobe, vaccinating an estimated 1.7 million children aged 14 weeks to 5 years (*8*). Plans are under way to include inactivated polio vaccine along with OPV in two SIAs during November–December 2014 for the remaining 12 LGAs in Borno/Yobe and 13 high-risk LGAs in the Kano transmission zone. A national strategy to increase SIA implementation quality also has included multi-intervention health camps** to build community confidence in government health programs.

The quality of SIAs is assessed using lot quality assurance sampling (LQAS)†† surveys to estimate whether OPV coverage thresholds have been met. During February 2013–September 2014, the number of LGAs conducting LQAS in the 11 high-risk states increased from 168 to 218; the proportion of LGAs at the ≥90% OPV coverage threshold increased from 36% to 67%, the proportion of LGAs at the 80%–89% threshold decreased from 29% to 25%, and the proportion of LGAs below the 80% threshold decreased from 36% to 7%. (Figure 1).

Poliovirus Surveillance

AFP surveillance. Polio surveillance relies on AFP case detection and confirmation of polio by laboratory viral isolation. The two primary performance indicators for AFP surveillance are a nonpolio AFP (NPAFP) rate of ≥2 cases per 100,000 children aged <15 years per year and collection of adequate stool specimens in ≥80% of AFP cases (*4*). The annualized NPAFP rate for 2014 was 14.4 per 100,000, and 98.8% of AFP cases had adequate stool specimen collection. This is higher than the 2013 NPAFP rate of 12.1 cases per 100,000, and 96.9% of AFP cases with adequate stool collection. All of the 11 high-risk states exceeded both indicator standards in 2013 and have continued to do so in 2014. The proportion of LGAs within these states that met both standards increased from 91.8% in 2013 to 99.3% in 2014.

Environmental surveillance. AFP surveillance is supplemented by environmental surveillance, with samples taken from effluent sewage sites every 4–5 weeks for poliovirus testing. By September 2014, environmental surveillance was conducted in 27 sites: Borno (four sites), Kaduna (three sites), Kano (three sites), Lagos (five sites), Sokoto (four sites), the Federal Capital Territory (two sites), Kebbi (three sites), and Katsina (three sites). During January–September 2014, WPV1 was identified in one sewage sample collected in May in Kaduna. In 2013, WPV1 was detected in four sewage samples (one from Kano in February, two from Sokoto in March and April, and one from Borno in October). WPV type 3 (WPV3) was last detected in a sewage sample from a site in Lagos in November 2012; cVDPV2 has been detected repeatedly in sewage samples from Sokoto and Borno since mid-2013, and in Kano and Kaduna since April 2014.

What is already known on this topic?

Nigeria is one of three countries worldwide where wild poliovirus (WPV) transmission has never been interrupted. Historically, poor public health infrastructure and poor-quality immunization activities have been considered responsible for failure of interruption, and strategies to combat such issues have been put in place in recent years, resulting in considerable programmatic improvements.

What is added by this report?

For the period January–September, WPV case incidence decreased dramatically from 49 in 2013 to six in 2014. However, transmission of circulating vaccine-derived poliovirus continues. Transmission of type 1 WPV is localized to two "transmission zones": Kano and Borno/Yobe, where supplemental immunization activities are being intensified. Quality of supplemental immunization activities has improved, as have acute flaccid paralysis surveillance indicators, but data suggest some surveillance gaps might still exist.

What are the implications for public health practice?

Nigeria has the potential to interrupt polio transmission in 2014, thus removing itself as a reservoir of WPV. National program innovations and strategies to improve polio vaccine coverage for underserved and hard-to-reach communities have resulted in measurable successes. The final steps toward polio eradication in Nigeria will require continuation of these efforts. If eradication becomes a reality, lesson learned and resources used towards this effort can be redirected towards addressing other national public health issues.

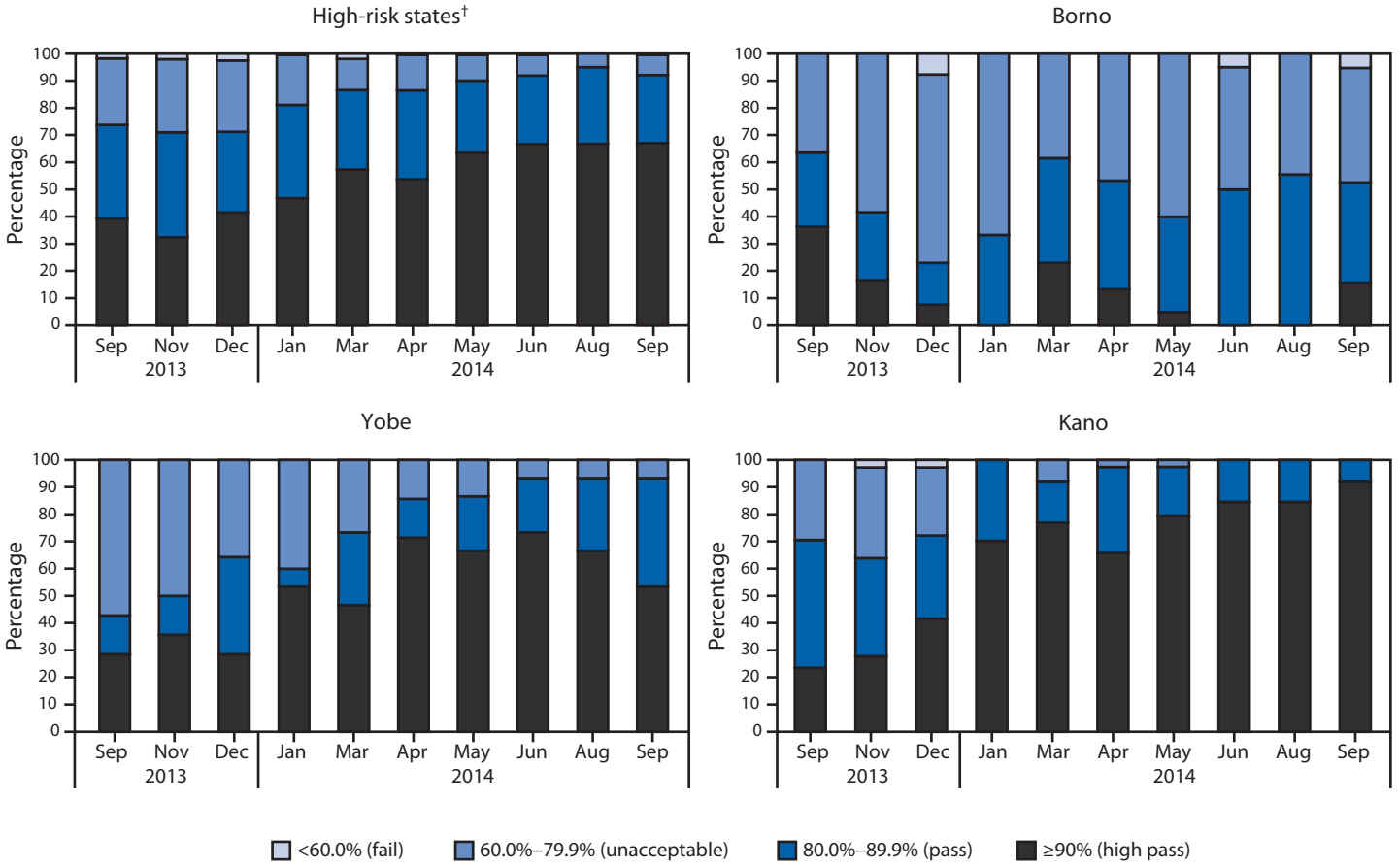
Wild Poliovirus Incidence

WPV and cVDPV incidence. As of September 2014, six WPV cases had been reported nationally, compared with 49 WPV cases for the same period in 2013. Reported cases decreased from 122 in 2012 to 53 in 2013. No WPV3 cases have been reported since November 2012 (Figures 2 and 3). WPV1 cases in 2014 have been limited to five cases in the

** Fixed-point vaccination centers providing a variety of primary health services during SIAs.

†† A clustered LQAS methodology is used to assess SIA quality by sampling the target population of children at the LGA level and documenting finger markings indicative of OPV receipt. A sample is drawn from six wards (geopolitical subunits) within the LGA, with 10 children in a single settlement selected at random from each sampled ward. This yields a total sample of 60 children per LGA. LGAs are classified into one of four classifications based on the number of unmarked children found: 0–3 dark green (high pass); 4–8 light green (pass); 9–19 yellow (unacceptable); >19 red (fail). A detailed description of the methodology is available at http://www.polioeradication.org/Portals/0/Document/Research/OPVDelivery/LQAS.pdf.

FIGURE 1. Percentage of local government areas with indicated quality category from lot quality assurance sampling (LQAS*) surveys assessing supplementary immunization activities, by state and month — northern Nigeria, September 2013–September 2014



* LQAS surveys are used to assess the quality of polio supplemental immunization activities (SIAs) in local government areas, using a four-category pass/fail scheme based on the proportion of children with a finger mark indicating they had recieved oral poliovirus vaccine during the SIA.
† Bauchi, Borno, Jigawa, Kaduna, Kano, Katsina, Kebbi, Niger, Sokoto, Yobe, and Zamfara.

"Kano transmission zone" (onset of most recent case on July 24, 2014) and one case in the "Borno/Yobe transmission zone" (onset of most recent case on April 19, 2014). Incidence of cVDPV2 cases varied from 10 in 2012 to four in 2013, to 21 in 2014 to date (12 in Borno, eight in Kano, one in Katsina).

Genomic sequence analysis. WPV genetic diversity in Nigeria declined during January 2013–September 2014. Eight genetic clusters of poliovirus were detected in 2012; of these, four were detected in 2013. Two genetic clusters detected in 2013 have been detected so far in 2014. Genomic sequence analysis can also be used to indicate AFP surveillance gaps not otherwise shown by surveillance performance indicators if poliovirus isolates have a nucleotide difference of ≥1.5% in the coding region of the major capsid protein, VP1, from the closest matching sequences of previously identified isolates (*4*). The number of WPV1 isolates with a nucleotide difference of ≥1.5% was 10 (of 103 isolates sequenced) in 2012, 10 (of 53) in 2013, and two (of six) to date in 2014.

Discussion

WPV incidence declined substantially in Nigeria during 2013–2014 coincident with a concerted effort of the national polio eradication program in coordination with global partners. In particular, during the high transmission season of June–September, reported cases declined 96% from 24 cases during 2013 to one case in 2014 (*8*). No WPV3 cases or environmental isolates have been identified since November 2012, indicating possible interruption of WPV3. SIA quality as assessed by LQAS surveys of OPV coverage has improved nationally, and multiple strategies are being implemented to target hard-to-reach communities and decrease vaccine refusals. Intensified implementation of SIAs is being focused on the "Kano" and "Borno/Yobe" transmission zones, with the

FIGURE 2. Number of reported cases of wild poliovirus type 1 (WPV1), wild poliovirus type 3 (WPV3), and vaccine-derived poliovirus type 2 (VDPV2), by month — Nigeria, January 2012–September 2014

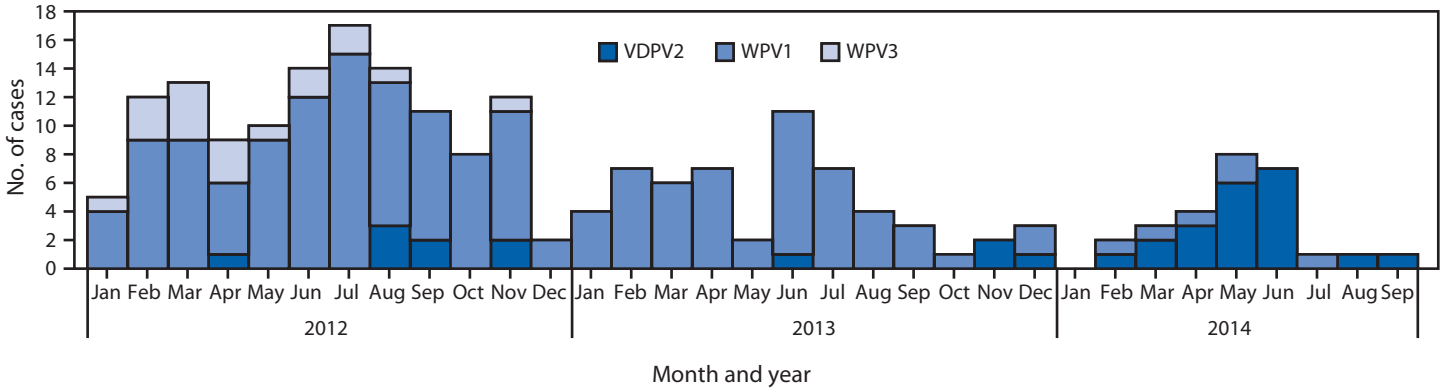
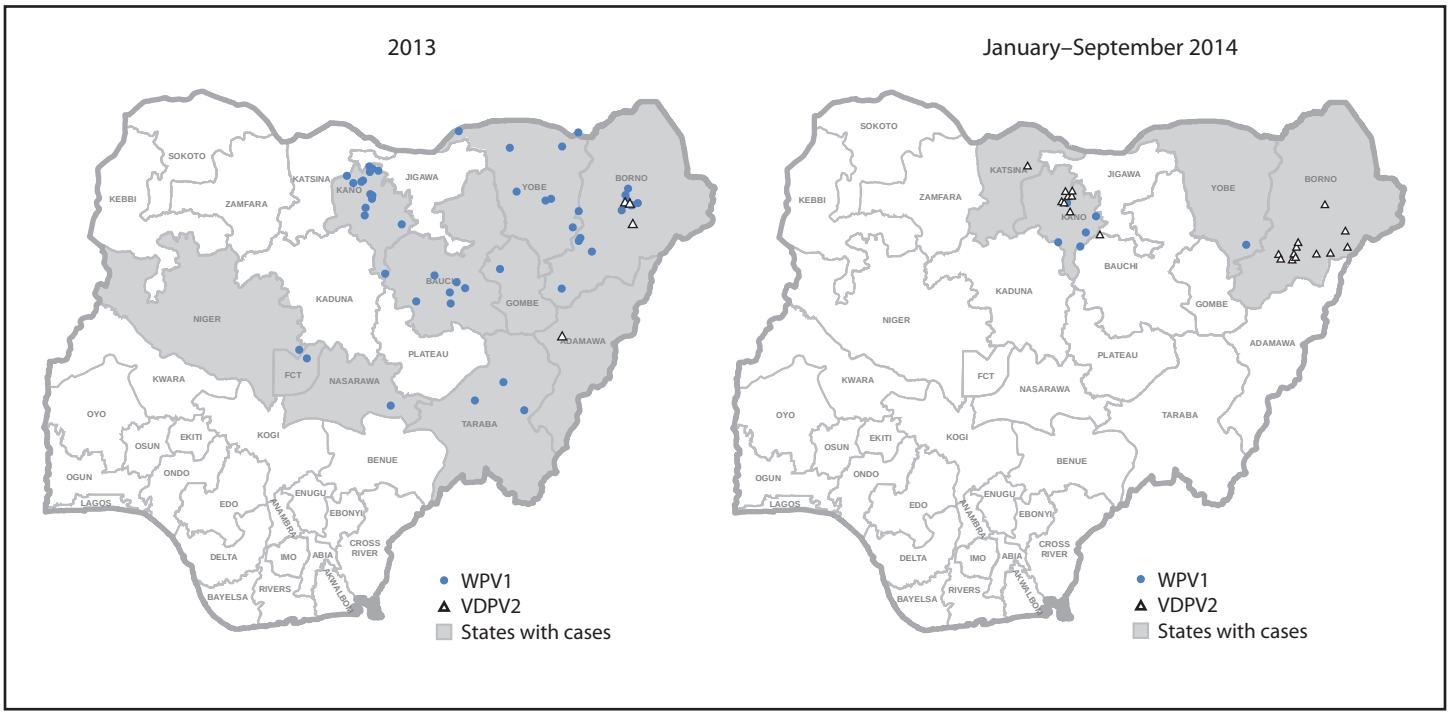


FIGURE 3. Distribution of reported cases of wild poliovirus type 1 (WPV1) and vaccine-derived poliovirus type 2 (VDPV2)*, by state — Nigeria, 2013 and January–September 2014



* Each dot represents one case placed at random within a local government area boundary. No cases of wild poliovirus type 3 were reported.

intention of interrupting the last remaining chains of WPV1 transmission by the end of 2014.

Despite meeting AFP surveillance performance indicators at national and subnational levels thus far in 2014, genomic sequencing analysis and continued detection of WPV1 in environmental surveillance strongly suggest that surveillance gaps at subnational levels remain. Improved standardization of surveillance activities at state and LGA levels is warranted.

With the main focus on prioritizing interruption of WPV transmission and the predominant use of bOPV during the majority of SIAs conducted during January 2013-September 2014, cVDPV2 incidence has increased. Two SIAs planned for the remainder of 2014 will use tOPV, and inactivated polio vaccine will be added in highest-risk LGAs in transmission zones to boost population immunity to levels needed to interrupt cVDPV2 transmission.

Some longstanding challenges to achieving polio eradication in Nigeria remain, and new challenges have emerged. Although the proportion of children nationally who received all vaccines based on national age-specific recommendations

increased from 13% in 2003 to 25% in 2013 (*7*) and OPV3 coverage has improved nationally, routine vaccination coverage has remained well below targeted coverage levels. The 11 high-risk states in particular have historically low coverage and will likely benefit from planned routine immunization intensification strategies, including a "hard-to-reach" project. This project aims to increase coverage in vulnerable and underserved areas by delivering polio vaccine along with other interventions aimed at preventing and treating childhood pneumonia, diarrhea, malaria, and other vaccine-preventable disease.

The strong support from all levels of government for polio eradication will need to be sustained and intensified, particularly as insecurity continues to restrict access to children during SIAs in areas of Borno, Yobe, and northern Adamawa. In addition, the emergence of widespread Ebola viral disease throughout West Africa has put a strain on health care infrastructure and personnel across the region. The recent Ebola outbreak in Nigeria was successfully interrupted in part because the polio eradication response infrastructure was used; in particular, members of the Nigeria Polio Emergency Operations Center were deployed to coordinate the multi-agency Ebola response (*9*). Continuing active management and addressing ongoing challenges can create the potential for a WPV-free African continent.

Acknowledgments

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Update: Ebola Virus Disease Epidemic — West Africa, November 2014

Incident Management System Ebola Epidemiology Team, CDC; Guinea Interministerial Committee for Response Against the Ebola Virus and the World Health Organization; CDC Guinea Response Team; Liberia Ministry of Health and Social Welfare; CDC Liberia Response Team; Sierra Leone Ministry of Health and Sanitation; CDC Sierra Leone Response Team; Viral Special Pathogens Branch, National Center for Emerging and Zoonotic Infectious Diseases, CDC

On November 18, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

CDC is assisting ministries of health and working with other organizations to end the ongoing epidemic of Ebola virus disease (Ebola) in West Africa (*1*). The updated data in this report were compiled from situation reports from the Guinea Interministerial Committee for Response Against the Ebola Virus and the World Health Organization, the Liberia Ministry of Health and Social Welfare, and the Sierra Leone Ministry of Health and Sanitation. Total case counts include all suspected, probable, and confirmed cases, which are defined similarly by each country (*2*). These data reflect reported cases, which make up an unknown proportion of all cases, and reporting delays that vary from country to country.

According to the latest World Health Organization update on November 14, 2014 (*3*), a total of 14,383 Ebola cases have been reported as of November 11 from three West African countries (Guinea, Liberia, and Sierra Leone) where transmission is widespread and intense. The highest reported case counts were from Liberia (6,878 cases) and Sierra Leone (5,586), followed by Guinea (1,919). Peaks in the number of new cases occurred in Liberia (509 cases), Sierra Leone (540 cases), and Guinea (292 cases) at epidemiologic weeks 38 (September 14–20), 44 (October 26–November 1), and 41 (October 5–11), respectively (Figures 1 and 2). A total of 5,438 deaths have been reported. Investigation of localized transmission in two locations in Mali (Kourémalé and Bamako) is currently underway (*4*). Transmission was interrupted successfully in Nigeria (October 19) and prevented in Senegal (October 17) (*3*).

The 2,705 new Ebola cases reported during October 19–November 8 were more widely distributed geographically among districts in Guinea and Liberia compared with the 2,809 new cases reported during September 28–October 18 (*5*). During both periods, counts of Ebola cases reported were highest in the area around Monrovia, Liberia; the Western and northwest districts of Sierra Leone, particularly Bombali and Port Loko; and the prefectures of Kérouané, Macenta, and Nzérékoré, Guinea (Figure 3).

As of November 8, the highest cumulative incidence rates (>100 cases per 100,000 population) were reported by two prefectures in Guinea (Guéckédou and Macenta), four counties in Liberia (Bomi, Lofa, and particularly Margibi and Montserrado), and five districts in Sierra Leone (Bombali, Kailahun, Kenema, Port Loko, and Western Area) (Figure 4). Evidence of decreasing incidence in Lofa and Montserrado, Liberia, is described elsewhere (*6*–*8*).

The latest updates on the 2014 Ebola epidemic in West Africa, including case counts, are available at http://www.cdc.gov/vhf/ebola/outbreaks/guinea/index.html. The most up-to-date infection control and clinical guidelines on the 2014 Ebola epidemic in West Africa are available at http://www.cdc.gov/vhf/ebola/hcp/index.html.

Acknowledgments

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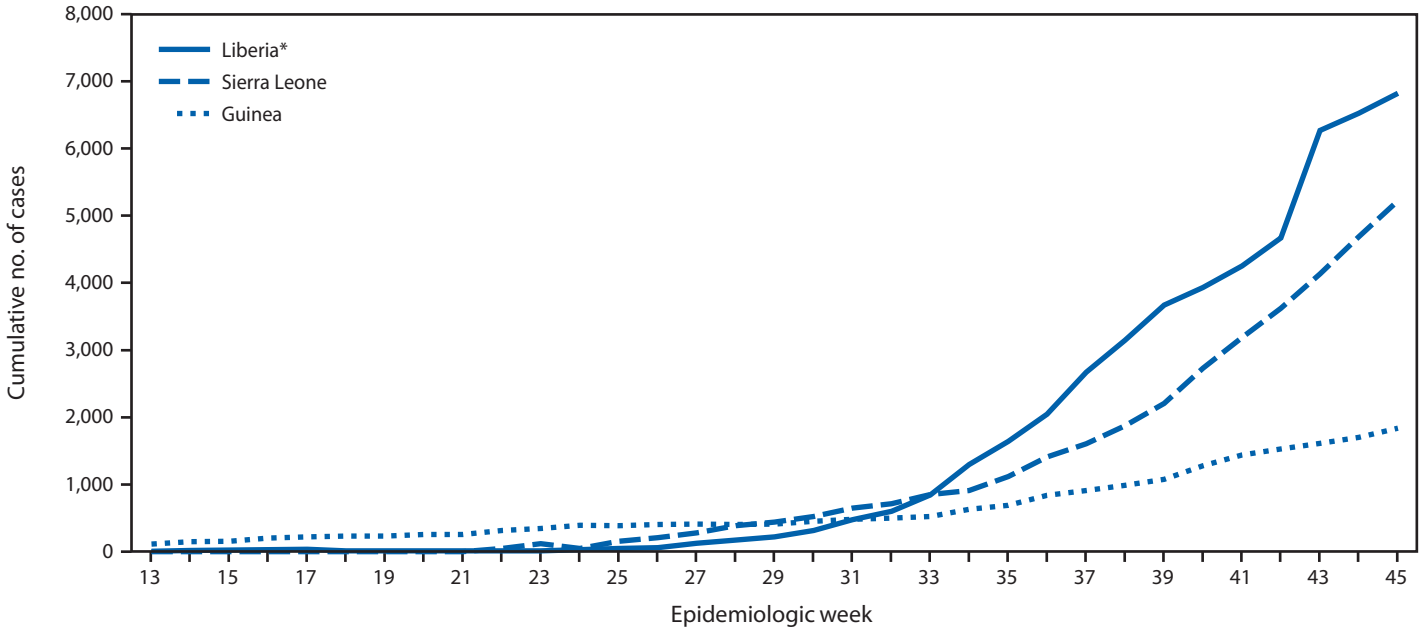
FIGURE 1. Cumulative number of Ebola virus disease cases reported, by epidemiologic week — three countries, West Africa, March 29–November 8, 2014



* A change in reporting source data at week 43 resulted in an adjustment of cumulative cases in Liberia.

FIGURE 2. Number of new Ebola virus disease cases reported, by epidemiologic week — three countries, West Africa, March 29–November 8, 2014

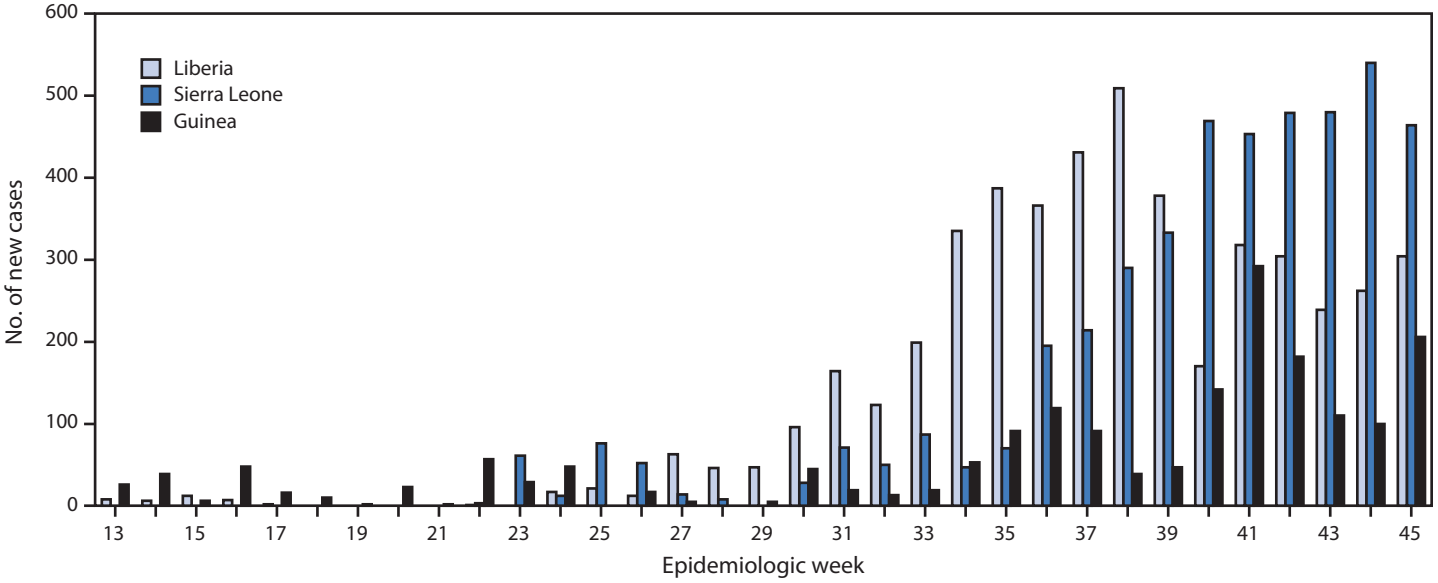


FIGURE 3. Number of new cases of Ebola virus disease reported — Guinea, Liberia, and Sierra Leone, October 19–November 8, 2014

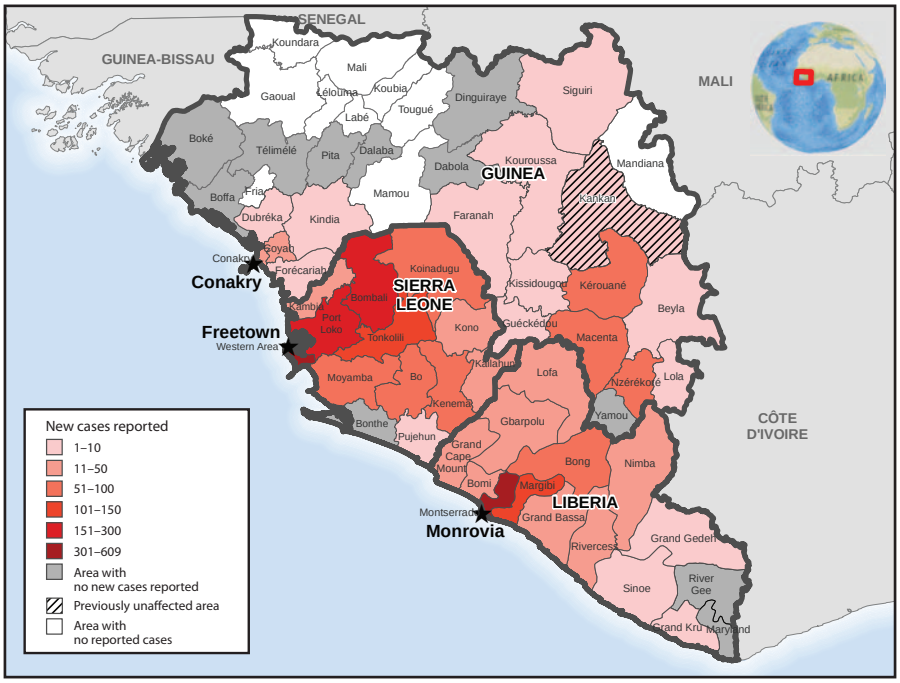
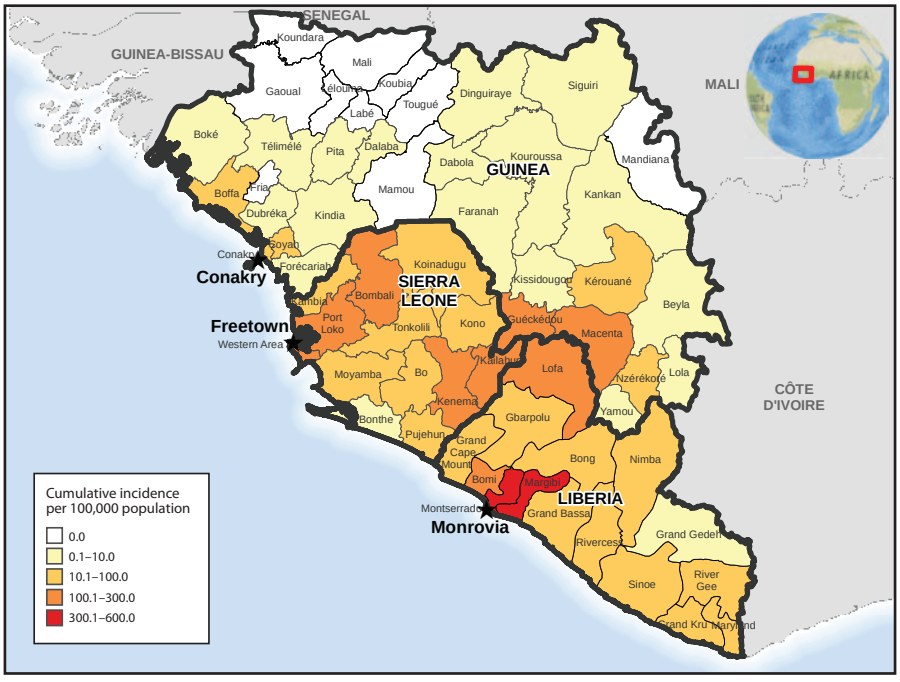


FIGURE 4. Cumulative incidence of Ebola virus disease — Guinea, Liberia, and Sierra Leone, November 8, 2014



Evidence for a Decrease in Transmission of Ebola Virus — Lofa County, Liberia, June 8–November 1, 2014

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On November 14, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Lofa County has one of the highest cumulative incidences of Ebola virus disease (Ebola) in Liberia. Recent situation reports from the Liberian Ministry of Health and Social Welfare (MoHSW) have indicated a decrease in new cases of Ebola in Lofa County (*1*). In October 2014, the Liberian MoHSW requested the assistance of CDC to further characterize recent trends in Ebola in Lofa County. Data collected during June 8–November 1, 2014 from three sources were analyzed: 1) aggregate data for newly reported cases, 2) case-based data for persons admitted to the dedicated Ebola treatment unit (ETU) for the county, and 3) test results for community decedents evaluated for Ebola. Trends from all three sources suggest that transmission of Ebola virus decreased as early as August 17, 2014, following rapid scale-up of response activities in Lofa County after a resurgence of Ebola in early June 2014. The comprehensive response strategy developed with participation from the local population in Lofa County might serve as a model to implement in other affected areas to accelerate control of Ebola.

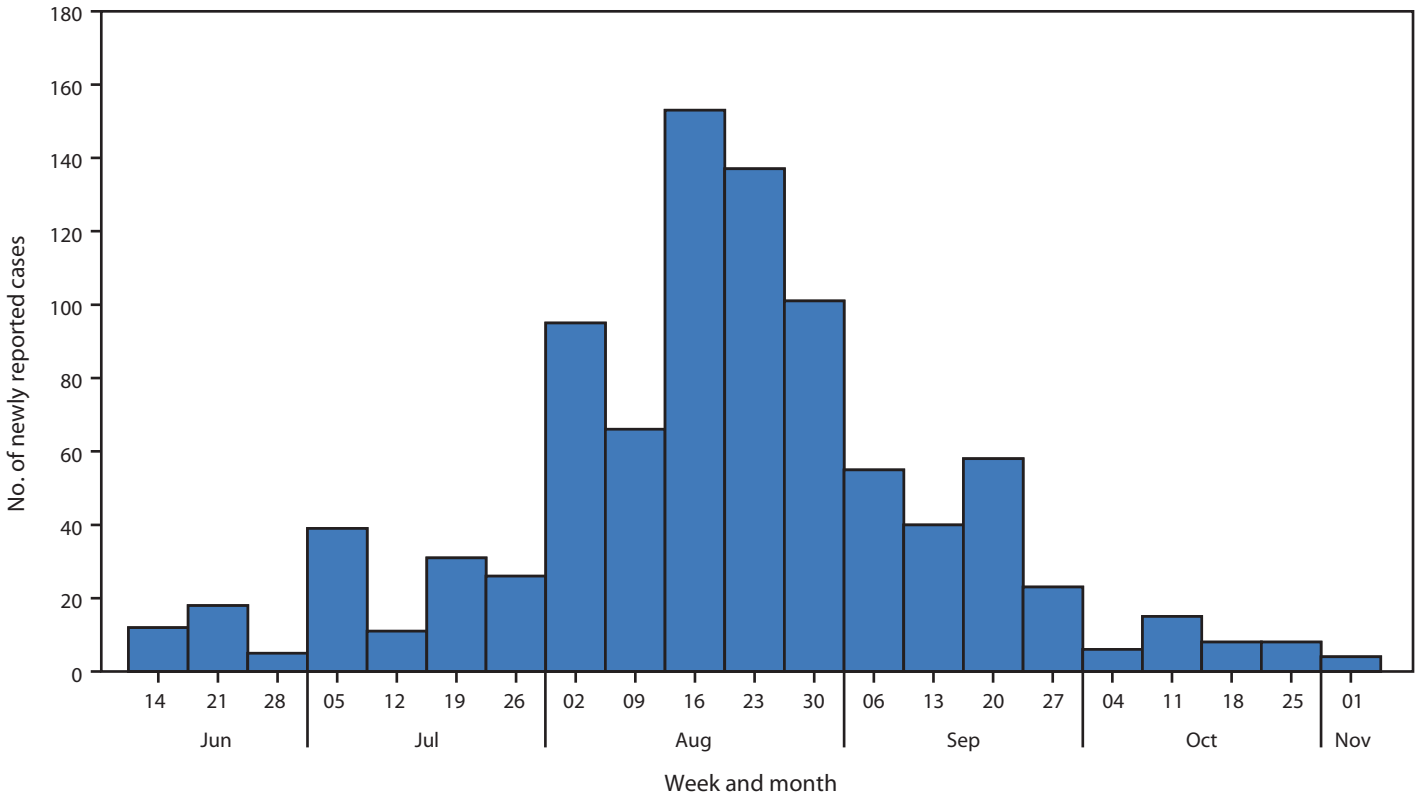
Liberia is in the midst of the largest outbreak of Ebola to date, with approximately 6,500 reported cases as of October 31, 2014 (*2*). MoHSW reported 623 cases in an estimated population of 300,000 in Lofa County by the end of October, the third highest cumulative incidence in Liberia (*3*).The first cases of Ebola in Liberia were reported in March 2014 in Foya (*4*), a town of approximately 20,000 persons in Lofa County in northern Liberia. After the emergence of Ebola in the county, local government health offices, nongovernmental organizations, and technical agencies developed a comprehensive response strategy in collaboration with communities. The strategy consisted of the following activities: 1) encouraging changes in local practices of caring for the ill and burying the dead, 2) developing a dedicated ETU in Foya that could efficiently accommodate increases in new admissions, 3) establishing a local hotline and outreach teams from Médecins Sans Frontières (MSF) and local health offices to rapidly transport persons with Ebola-like symptoms to the Foya ETU and safely bury persons suspected of dying from Ebola, 4) establishing a dedicated laboratory facility for rapid case identification, 5) active case-finding in areas with newly reported cases, and 6) training general community health volunteers to conduct contact tracing of persons with known exposures. No cases were reported in the county during April 9–May 31, but cases reappeared in early June (*5*). The intensity and thoroughness of activities increased in response to the resurgence in Ebola.

In September 2014, national situation reports suggested a decrease in new cases of Ebola in Lofa County. In early October, MoHSW asked CDC to further characterize trends in Ebola in the county. The following data from June 8 to November 1, 2014, were reviewed: 1) aggregate data for newly reported suspected, probable, and confirmed cases of Ebola; 2) case-based data for persons admitted to the Foya ETU operated by MSF; and 3) test results for oral swab specimens collected from persons who died in the community and whose deaths were investigated for possible Ebola.

Aggregate data for newly reported cases were obtained from the county health office and publicly available national situation reports published by Liberian MoHSW. These data include new cases reported daily by local health offices in the six districts of Lofa County. The weekly number of new cases increased from 12 in the week ending June 14 to 153 in the week ending August 16, and then decreased, reaching four new reported cases in the week ending November 1 (Figure 1).

MSF provided deidentified case-based data of persons admitted to the Foya ETU. Final epidemiologic classification of cases was consistent with case definitions described by the World Health Organization (*6*). Laboratory tests for Ebola virus were performed by the European Mobile Laboratory (EMLab) Consortium in Guéckédou, Guinea, and Foya, Liberia. Reverse transcription–polymerase chain reaction (RT-PCR) assay was used for laboratory confirmation. An illness in a person who tested negative for Ebola virus after more than 72 hours of symptoms was designated as not Ebola, and an illness in a person who tested positive for Ebola virus, regardless of duration of symptoms, was classified as a confirmed case of Ebola. An illness in a person without accompanying laboratory data was designated as an unknown disease.

FIGURE 1. Aggregate number of newly reported Ebola cases, by week — Lofa County, Liberia, June 8–November 1, 2014



Case-based data for persons admitted to the Foya ETU describe a trend (Figure 2) similar to that of the aggregate data for newly reported cases. The number of persons admitted increased from 14 in the week ending June 14, to a peak of 133 in the week ending August 16. Admissions then decreased, reaching one person admitted in the week ending November 1. The percentage of persons who had a final classification of not infected with Ebola increased from 25% during June 8–August 9, to a peak of 59% in the week ending August 16, and subsequently decreased to 41% during August 17–November 1. Overall, 40% of persons admitted to the Foya ETU had illnesses not caused by Ebola virus.

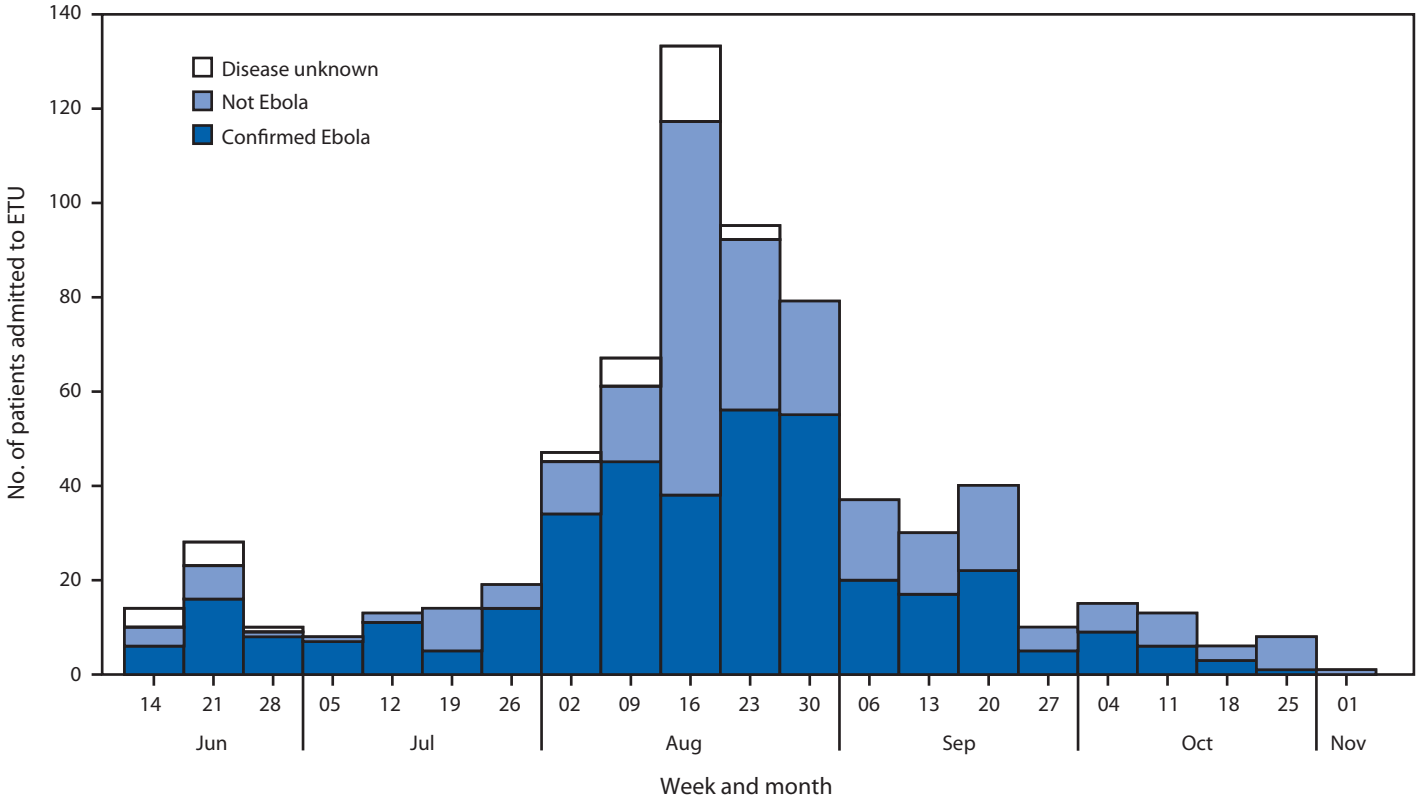
Oral swab specimens were collected by outreach teams from MSF and district health offices from persons who died in communities with symptoms suggestive of Ebola. Specimens were analyzed by the EMLab field laboratories using RT-PCR, which has similar performance on oral swab specimens and blood specimens (*7*). Test results for oral swab specimens from EMLab were linked to case-based data for community decedents from MSF. The trend in the proportion of deaths in the community attributed to Ebola virus also suggested a recent decrease in transmission (Figure 3). During June 8–August 16, a total of 35 (95%) of 37 swab specimens tested positive for Ebola virus; during August 24–November 1, only 21 (25%) of 85 tested positive.

Discussion

The trends in numbers of newly reported cases, persons admitted to the Foya ETU, and positivity rate among community decedents evaluated for Ebola virus during June 8–November 1, 2014, are consistent with a substantial decrease in transmission of Ebola virus in Lofa County beginning as early as August 17, 2014. The aggregate data from the Lofa County Health Office and case-based data from the Foya ETU describe a peak of reported cases and new admissions respectively in the week ending August 16 followed by a decline in subsequent weeks. The high percentage of positive specimens collected from community decedents during June 8–August 16 suggests that Ebola was causing deaths in communities, whereas the lower percentage during August 24–November 1 suggests that other endemic diseases, such as malaria or typhoid, had become the main causes of mortality as transmission of Ebola virus decreased. The findings from this analysis might indicate the first example in Liberia of a successful strategy to reduce the transmission of Ebola virus in a county with high cumulative incidence.

Transparency in activities and engagement with the community were central to the response strategy in Lofa County. For example, the Foya ETU was designed without high, opaque walls to minimize fear of the facility. Family members were permitted to visit their loved ones in the ETU, either by talking

FIGURE 2. Number of patients admitted to an Ebola Treatment Unit (ETU) operated by Médecins Sans Frontières in the town of Foya, by week and final classification — Lofa County, Liberia, June 8–November 1, 2014



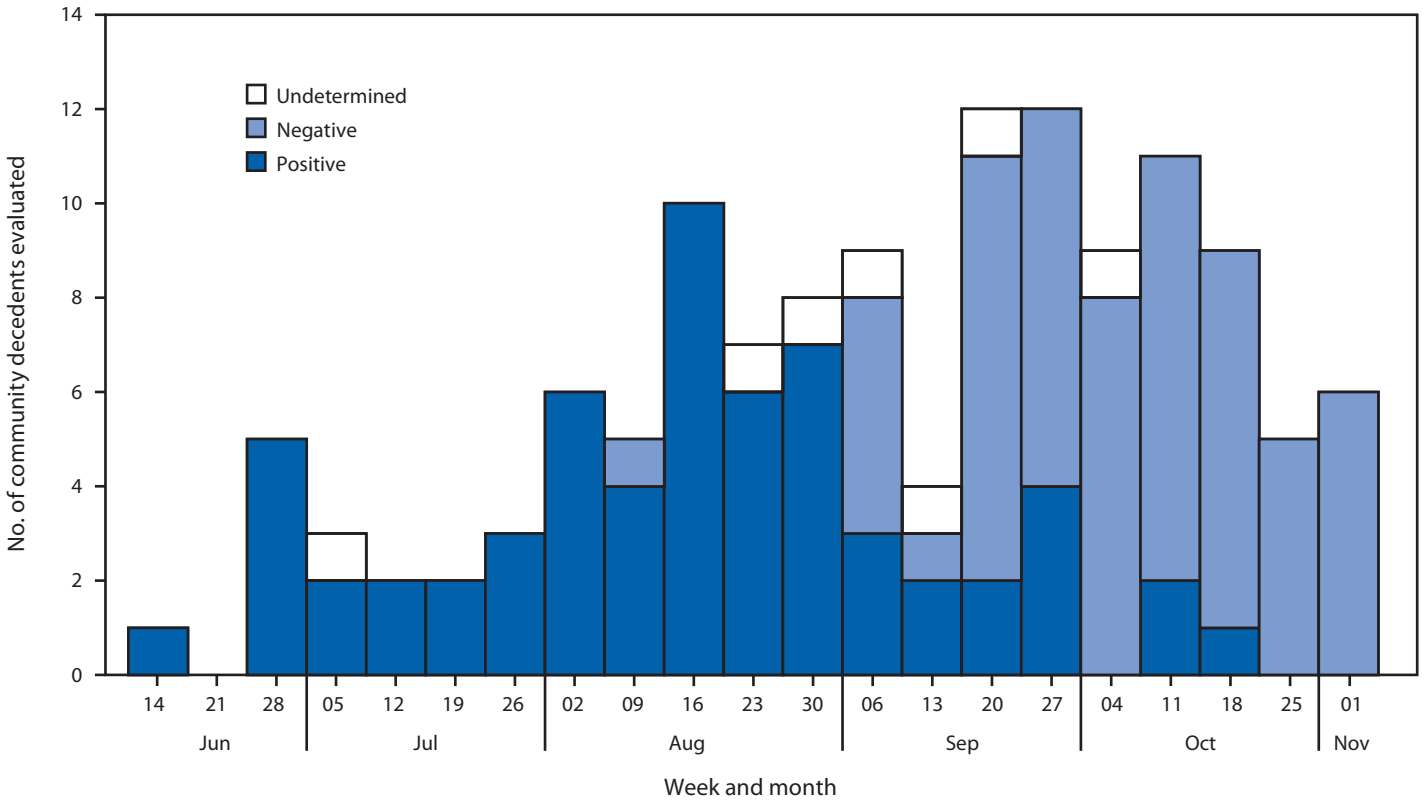
with them across a fence or inside the ward while wearing full personal protective equipment. Decedents in the ETU were buried in the presence of family members at designated burial sites in graves with clear identification. In communities, rapid transport of ill persons to the ETU and safe burial of persons suspected of dying from Ebola demonstrated to the local population that partners could quickly respond to requests for help. During safe burials of community decedents, family members were invited to hold grieving ceremonies according to local customs in memory of the deceased. Engagement with the local population might have built confidence in response activities and contributed to the success of the strategy.

Data on final classifications of patients admitted to the Foya ETU and test results from community decedents indicate ongoing engagement from the community. The high percentage of non-Ebola cases among persons admitted to the ETU during the peak of admissions suggests that the community and health workers were aware that persons with symptoms suggestive of Ebola should be evaluated at the ETU. The high percentage of non-Ebola cases among new admissions in recent weeks and the increasing number of weekly specimens collected from community decedents suggests that trust in response activities remains strong in the local population despite the recent decrease in cases.

Although transmission in Lofa County might have decreased, situation reports from MSF, EMLab, and the World Health Organization have indicated an increase in cases during September and October in Macenta (*8,9*), a health district in Guinea bordering Lofa County. Based on interviews with response partners, the decrease in cases and community deaths from Ebola in Lofa County is not believed to have resulted from the emigration of ill persons from Lofa to Macenta. However, ill persons are entering Lofa County from elsewhere. Among patients admitted to the Foya ETU in the week ending October 4, half were persons who had exposures in Monrovia, Liberia, before traveling to Lofa County. Expansion of control activities attentive to the needs and sensitivities of the local population in other regions is needed to accelerate progress in stopping the spread of Ebola virus.

Recent reports indicate that transmission of Ebola virus in Liberia is ongoing (*10*). The findings from this analysis suggest that transmission might be controlled at the county level by a comprehensive response strategy developed by government health offices, nongovernmental organizations, and technical agencies in collaboration with the local population. The strategy in Lofa County might serve as a model for decreasing transmission of Ebola virus in areas where Ebola is still prevalent and spreading. Although transmission of Ebola virus might have

FIGURE 3. Test results for specimens collected from community decedents evaluated for Ebola, by week — Lofa County, Liberia, June 8–November 1, 2014



What is already known on this topic?

Lofa County in Liberia has one of the highest numbers of reported cases of Ebola virus disease (Ebola) in West Africa. Government health offices, nongovernmental organizations, and technical agencies coordinated response activities to reduce transmission of Ebola in Lofa County. The intensity and thoroughness of activities increased in response to the resurgence of Ebola in early June.

What is added by this report?

Trends in new reported cases, admissions to the dedicated Ebola treatment unit in the town of Foya, and test results of community decedents evaluated for Ebola virus suggest transmission of Ebola virus decreased in Lofa County as early as August 17, 2014, following rapid scale-up of response activities after a resurgence of Ebola in early June.

What are the implications for public health practice?

A comprehensive Ebola response strategy developed with participation from the local community and rapidly scaled up following resurgence of Ebola might have reduced the spread of Ebola virus in Lofa County. The strategy implemented in Lofa County might serve as a model for reducing transmission of Ebola virus in other affected areas.

decreased, new cases continue to be reported by the Lofa County Health Office and admitted to the Foya ETU. Partners in the response should remain vigilant and continue their activities to further enhance the control of Ebola in Lofa County.

Acknowledgments

Liberian Ministry of Health and Social Welfare. CDC Liberia Field Team. MSF Field Teams in Voinjama and Foya, Liberia. EMLab Field Teams in Gueckedou, Guinea, and Foya, Liberia. World Health Organization. Public Health England, Salisbury, United Kingdom. Viral Special Pathogens Branch, Division of High-Consequence Pathogens and Pathology, National Center for Emerging and Zoonotic Infectious Disease, CDC.

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Evidence for Declining Numbers of Ebola Cases — Montserrado County, Liberia, June–October 2014

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On November 14, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

The epidemic of Ebola virus disease (Ebola) in West Africa that began in March 2014 has caused approximately 13,200 suspected, probable, and confirmed cases, including approximately 6,500 in Liberia (*1,2*). About 50% of Liberia's reported cases have been in Montserrado County (population 1.5 million), the most populous county, which contains the capital city, Monrovia. To examine the course of the Ebola epidemic in Montserrado County, data on Ebola treatment unit (ETU) admissions, laboratory testing of patient blood samples, and collection of dead bodies were analyzed. Each of the three data sources indicated consistent declines of 53%–73% following a peak incidence in mid-September. The declines in ETU admissions, percentage of patients with reverse transcription–polymerase chain reaction (RT-PCR) test results positive for Ebola, and dead bodies are the first evidence of reduction in disease after implementation of multiple prevention and response measures. The possible contributions of these interventions to the decline is not yet fully understood or corroborated. A reduction in cases suggests some progress; however, eliminating Ebola transmission is the critical goal and will require greatly intensified efforts for complete, high-quality surveillance to direct and drive the rapid intervention, tracking, and response efforts that remain essential.

ETU Admission Data

ETU admission data include all admissions to the four Montserrado ETUs* as reported to the Ministry of Health and Social Welfare for the period June 13–October 26, 2014. Of 2,916 patients admitted, admission dates were available for 2,768 (95%). For purposes of this analysis and because ETU admission data do not contain information on symptoms or Ebola risks, classification of cases depended on ETU documentation of negative Ebola RT-PCR test results: 1) a non-Ebola case was defined as a case in which a patient was admitted to an ETU but released as Ebola-negative based on ETU documentation of a negative Ebola test result by RT-PCR and there was absence of any ETU-documented positive Ebola test result, and 2) an Ebola case was defined as a case in which a patient did not have an ETU-documented negative RT-PCR test result, even if laboratory results were not recorded (including confirmed cases [those with ETU documentation of a positive RT-PCR test result], as well as probable and suspected cases for which there were no ETU-documented negative RT-PCR test results). Release as a non-Ebola patient was based on a patient having two consecutive negative Ebola RT-PCR tests at least 72 hours apart. It was not possible to make exclusions based on county of residence.

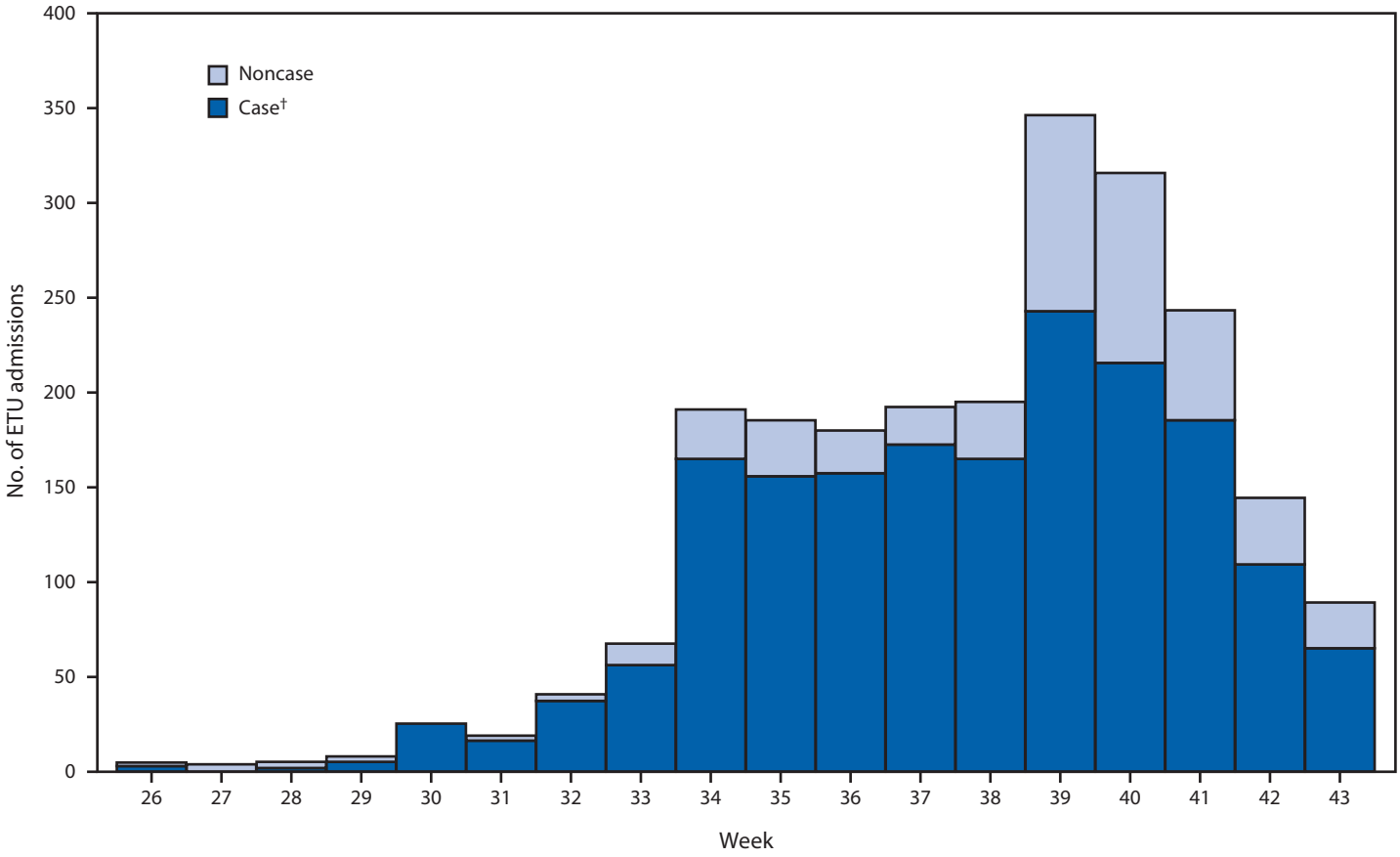
The number of admissions to ETUs rose to a maximum of 255 patients during epidemiologic week 39 (beginning September 22) and then declined by 67% to approximately 70 per week by week 43 (October 26) (Figure 1). Ebola cases and noncases followed this trajectory. The number of beds available for Ebola patients rose substantially, from fewer than 100 to more than 500 beds during the study period, moving from an initial shortage to a surplus. Because patients were turned away from ETUs due to bed shortages during the period when the number of Ebola cases was rising, the number of ETU admissions was effectively capped during various weeks; thus, the number of patients who could have been admitted during August and September is not depicted (Figure 1). Eternal Love Winning Africa (ELWA)-2 ETU began operating on July 20, ELWA-3 and John F. Kennedy (JFK) ETUs began operating August 17, Island Clinic ETU opened on September 20, and JFK ETU closed October 7. Trends in ETU admissions are affected by changes in the number of available ETU beds and might be influenced by changes in migration of patients to and from other counties. However, availability of ETU beds was stable or increasing during the last 4 weeks analyzed, when there were also no large shifts in patient migration to account for the decline of ETU admissions observed.

Ebola Laboratory Test Data

Laboratory test results for Ebola by RT-PCR were provided by three dedicated laboratories processing samples for Montserrado County for the period August 18–October 26,

*ETUs located in Montserrado are ELWA-2 (Eternal Love Winning Africa), ELWA-3, Island Clinic, and JFK (John F. Kennedy) ETUs.

FIGURE 1. Number of admissions to Ebola treatment units (ETUs),* by week and case status — Montserrado County, Liberia, June 13–October 26, 2014



* ETUs located in Montserrado County are ELWA (Eternal Love Winning Africa)-2, ELWA-3, Island Clinic, and JFK (John F. Kennedy) ETUs. ELWA-2 began operating on July 20, ELWA-3 and JFK began operating on August 17 (week 34), Island Clinic began operating on September 20 (week 38), and JFK closed on October 7 (week 41).
† Includes cases that have been confirmed with ETU documentation of positive Ebola reverse transcription–polymerase chain reaction (RT-PCR) results, as well as those probable and suspect cases for which there are no ETU-documented negative RT-PCR results.

2014.† Results were available for 5,866 specimens, representing 4,077 patients. Because patient-level identifiers were not assigned consistently, a unique identifier was created using a patient's initials, sex, age, and home location to link multiple specimen records for the same patient. In total, 405 specimens (7%) lacked the information necessary for assignment of an identifier and were excluded. Test week was based on when the first specimen was taken. Results from patients with reported home locations outside Montserrado County were excluded.

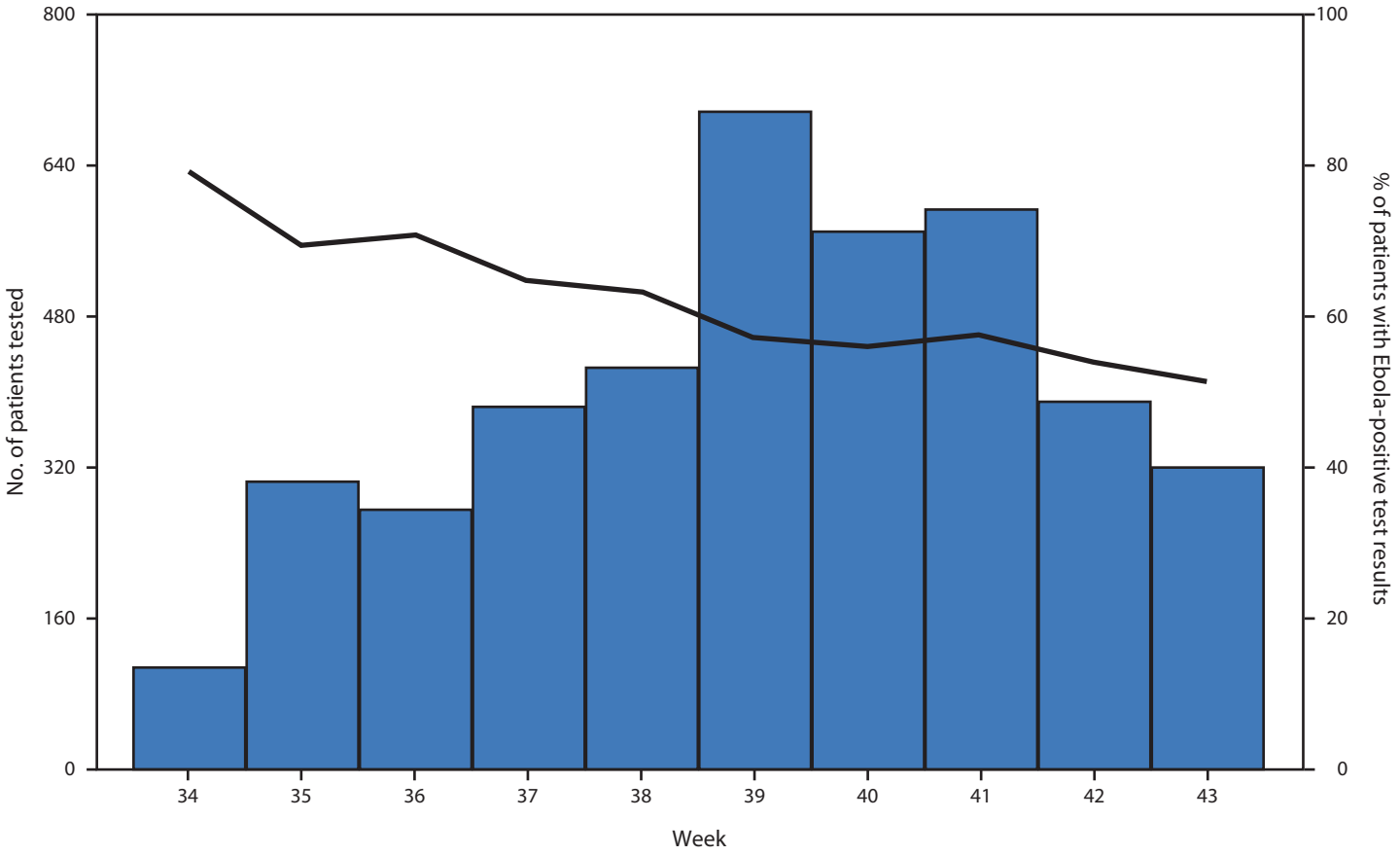
† Laboratories located in Montserrado County and included in this analysis included 1) the CDC/National Institutes of Health (NIH) laboratory, which tested specimens from ELWA-2 and ELWA-3; 2) the Island Clinic Laboratory managed by the U.S. Navy, which tested specimens for the Island Clinic ETU; and 3) the Liberian Institute of Biomedical Research laboratory operated by NIH and the U.S. Army Medical Research Institute of Infectious Diseases, which received specimens from various other sources.

Mirroring ETU admissions, the number of patients tested increased through week 39, reaching an average of 100 patients per day, followed by a decline through week 43, at an average of 46 patients per day. The percentage of patients with Ebola-positive RT-PCR test results, excluding repeat tests for individual patients based on the unique identifier, declined gradually over the entire period, from a maximum of 79% positive at week 34 (August 18) to 51% positive by week 43 (October 20) (Figure 2).

Body Collection Data

Since late July 2014, the International Federation of Red Cross and Red Crescent Societies (IFRC) has been responsible for the collection and cremation of all dead bodies from ETUs (except ELWA-3) and bodies from the community. For the

FIGURE 2. Number of patients with RT-PCR tests performed (bars) and percentage of patients with Ebola-positive test results (line), by week — Montserrado County, Liberia, August 18–October 26, 2014*



Abbreviation: RT-PCR = reverse transcription–polymerase chain reaction.

* Laboratory results are calculated per patient by week of first positive test performed. Repeat tests for a given individual were removed. CDC/National Institutes of Health and Island Clinic laboratories began operating on August 20 (week 34) and October 2 (week 40), respectively. The Liberian Institute of Biomedical Research laboratory began testing specimens on August 7 (week 32); however, data from before week 34 were excluded because of the lack of sufficient information to identify multiple samples from individual patients.

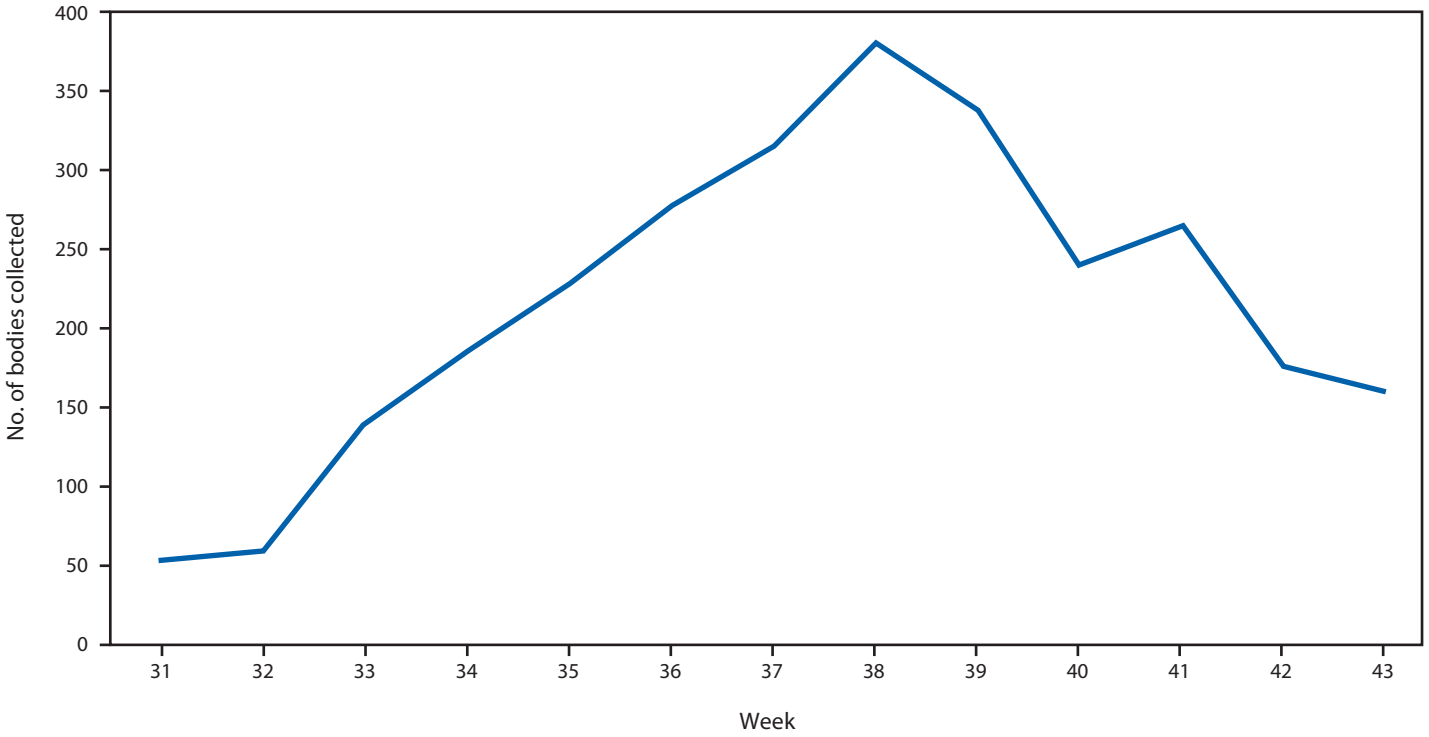
period July 28–October 26, a total of 2,234 bodies were collected by the IFRC. The majority (1,179 [53%]) were collected from homes or other community settings, 744 (33%) from ETUs, 194 (9%) from non-ETU health facilities, and 117 (5%) from unknown locations. ELWA-3 operates its own crematorium. To examine the trend of the total number of bodies collected, ELWA-3 records (n = 578) were combined with the totals from IFRC (Figure 3). The number of bodies believed to be the result of an Ebola-related death rose to a maximum in week 38 (September 15), with 380 bodies collected, and then declined to 160 by week 43 (October 20). The pattern was similar for both the IFRC and ELWA-3.

Discussion

The decline in the number of Ebola cases in Montserrado County from a peak in mid-September was indicated by three data sources: ETU admissions (73% decline), laboratory results (58% decrease in Ebola-positive test results), and body collection (53% decline). The patterns of change in the three indicators were similar, and there is no apparent common source of systematic error that can account for simultaneous decline in all three indicators. These analyses support accumulating anecdotal evidence that cases in the county were substantially lower in late October than 2 months earlier.

This analysis depends on existing program records collected by several independent groups. The magnitude of the epidemic overwhelmed the routine data collection system, and each of the data sets analyzed contained incomplete or indecipherable records that were removed before analysis. The manual linkage of patient records required substantial data processing and limited the ability to compare information between data sources.

FIGURE 3. Number of bodies collected by IFRC and ELWA-3, by week — Montserrado County, Liberia, July 28–October 26, 2014



Abbreviations: IFRC = International Federation of Red Cross and Red Crescent Societies; ELWA = Eternal Love Winning Africa.

Assignment of a unique patient/case identifier at first patient contact would improve surveillance and data management.

The completeness of records was further compromised by refusal of an unknown number of persons to report cases or burials (Montserrado County Contact Tracing Team, personal communication, 2014). The need to cremate Ebola-related dead bodies has encountered resistance from the local population, raising the possibility that bodies might have been hidden and independently buried. A rapid community assessment performed in October examining community perceptions and avoidance of cremation, however, suggests no increase in frequency of such secret burials during September and October to account for the recorded decrease in body collection (African Union and CDC, unpublished data, 2014).

The numbers of cases projected, based on an exponential growth model that used early epidemic trends and assumed no effective interventions, did not materialize (*3,4*). However, Ebola is far from eliminated in Montserrado, and the continued weekly discovery of new cases indicates that elimination from the county could be lengthy and progress could be reversed. The medical and humanitarian response to Ebola in Liberia, including isolation and care of patients, contact tracing and management, supportive care, safe burials, and the establishment of a coordinating incident management system, have been augmented by an intense and pervasive program by government and partners to educate the public on symptoms, prevention, and care of the infected, as well as the appropriate handling of the bodies of Ebola victims (*5,6*). Community action, aided by use of this information, might have substantially contributed to the decline. Most Liberian communities, whether villages or dense urban blocks, have respected, informed leaders who have in many cases initiated protective actions, such as contact identification, active case detection, insistence on safe burials, and isolation or quarantine measures, usually in the aftermath of a neighbor's infection. Enlistment of community leaders as key informants to develop a comprehensive surveillance network will be an essential component of ongoing surveillance and response. Equally critical is the need to intervene rapidly with isolation of and care for the sick, as well as rapid removal of the bodies of Ebola victims for a respectful but safe burial. This is especially important if the epidemic matures into a widespread patchwork of small outbreaks that threaten to expand in the absence of quick and decisive responses.

What is already known on this topic?

The epidemic of Ebola virus disease (Ebola) began as small foci of cases in the border regions of Guinea, Sierra Leone, and Liberia before March 2014. It has now infected approximately 13,200 persons in eight countries. Liberia has had the most reported cases, approximately half of which have occurred in Montserrado County.

What is added by this report?

A decline in the number of Ebola cases in Montserrado County from a peak in mid-September is indicated by three data sources: admissions to Ebola treatment units (73% decline), laboratory results (58% decrease in patients with Ebola-positive test results), and body collection (53% decline).

What are the implications for public health practice?

Decreases in Ebola in one county indicate the potential for and challenge of elimination of Ebola. There remains the risk that progress can be reversed as long as new cases continue to be identified. Rapid response teams, effective contact tracing, prompt isolation and care, infection control throughout the health care system, and increased emphasis on working with networks of community leaders to report and respond to cases will be critical to eliminating human-to-human transmission.

Acknowledgments

World Health Organization, US Army Medical Research Institute of Infectious Diseases, National Institutes for Health, US Navy.

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Ebola Virus Disease Cases Among Health Care Workers Not Working in Ebola Treatment Units — Liberia, June–August, 2014

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On November 14, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

West Africa is experiencing the largest Ebola virus disease (Ebola) epidemic in recorded history. Health care workers (HCWs) are at increased risk for Ebola. In Liberia, as of August 14, 2014, a total of 810 cases of Ebola had been reported, including 10 clusters of Ebola cases among HCWs working in facilities that were not Ebola treatment units (non-ETUs). The Liberian Ministry of Health and Social Welfare and CDC investigated these clusters by reviewing surveillance data, interviewing county health officials, HCWs, and contact tracers, and visiting health care facilities. Ninety-seven cases of Ebola (12% of the estimated total) were identified among HCWs; 62 HCW cases (64%) were part of 10 distinct clusters in non-ETU health care facilities, primarily hospitals. Early recognition and diagnosis of Ebola in patients who were the likely source of introduction to the HCWs (i.e., source patients)* was missed in four clusters. Inconsistent recognition and triage of cases of Ebola, overcrowding, limitations in layout of physical spaces, lack of training in the use of and adequate supply of personal protective equipment (PPE), and limited supervision to ensure consistent adherence to infection control practices all were observed. Improving infection control infrastructure in non-ETUs is essential for protecting HCWs. Since August, the Liberian Ministry of Health and Social Welfare with a consortium of partners have undertaken collaborative efforts to strengthen infection control infrastructure in non-ETU health facilities.

Human-to-human transmission of Ebola virus occurs through direct contact with the body fluids of symptomatic or deceased patients. HCWs in Liberia working without adequate infection control equipment and protocols are at high risk for infection given their close physical contact with Ebola patients and potential exposure to body fluids. HCWs have accounted for up to 25% of infected persons during previous outbreaks (*1*). Isolating infected patients is essential for preventing transmission to others, and historically this has been accomplished by caring for infected persons in specialized ETUs with strict isolation and infection control protocols, including guidelines for patient movement, physical layout, disinfection, and use of PPE designed to protect HCWs and patients (*2,3*). Ideally, all patients suspected of having Ebola would be triaged and tested at an ETU (*1*); however, before recognition of Ebola and transfer to an ETU, infected patients often are cared for in non-ETU health care facilities. Treatment of Ebola in non-ETU health care facilities is particularly difficult in Liberia, where the health care system is understaffed and under-resourced (*4*). Visits to non-ETU health care facilities revealed that basic materials for standard infection control practices such as gloves, soap, and water often were inadequate, and overcrowding in patient care areas plus the lack of physically separated spaces made isolation difficult. Because Ebola is a febrile illness with nonspecific signs and symptoms, differentiating it from many other common febrile illnesses is difficult, potentially delaying isolation.

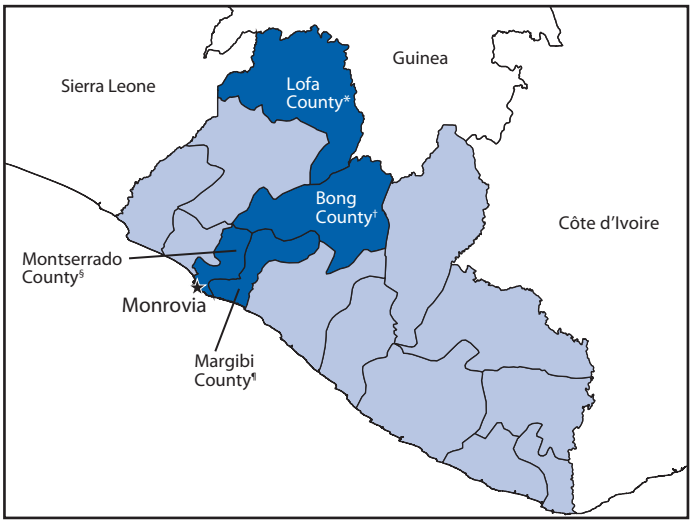
As of August 14, 2014, a total of 810 confirmed, probable, and suspected cases of Ebola† in six of Liberia's 15 counties had been reported (*5*). There were two primary epicenters in Liberia: Lofa County in northwestern Liberia, where the outbreak in Liberia was initially detected following movement of infected persons over the border from Guinea; and Montserrado County, which includes the capital city of Monrovia (Figure). Because of the scale and geographic distribution of the outbreak, the lack of staff, beds, and transportation to ETUs, as well as patient resistance to being treated in ETUs, only an estimated 25% of known Ebola patients had been treated at an ETU as of August 14, 2014 (*5*). At the request of the Liberian Ministry of Health and Social Welfare, CDC collaborated with the ministry to investigate risks associated with working in health care settings and possible sources of exposure among HCWs.

Reviews were performed of national surveillance data, including case report forms, health care facility line lists, the national surveillance database, and laboratory results. Clusters were defined as two or more confirmed, probable, or suspected cases of Ebola among HCWs who had dates of symptom onset or, when symptom onset was not available, dates of diagnosis

* Source patient is defined as the initial patient in a chain of transmission within the health facility. These include a patient whose Ebola infection was unsuspected (patient zero) and a patient whose Ebola infection was suspected (index case) on admission.

† Case definitions available at http://www.who.int/csr/resources/publications/ebola/ebola-case-definition-contact-en.pdf?ua=1.

FIGURE. Counties of Liberia where clusters of Ebola virus disease were reported among health care workers in health care facilities that were not Ebola treatment units — June 9–August 14, 2014



* Three clusters with 12 total cases (nine confirmed).
† One cluster with five total cases (five confirmed).
§ Five clusters with 23 total cases (19 confirmed).
¶ One cluster with 22 total cases (17 confirmed).

within 21 days of each other and any subsequent chains of transmission. Source patients were identified prospectively in some clusters, and retrospectively in others. Evaluations of the recognized clusters of HCWs were performed using unstructured in-person and telephone interviews with county health officials, hospital staff members, and contact tracers, as well as visits to six of the 10 health facilities with identified clusters of Ebola among HCWs. HCW cases of Ebola not identified as part of the clusters and risk factors outside of health care settings were not evaluated. No patient care was directly observed.

Review of national case-based surveillance data and field investigations of clusters of Ebola in HCWs through August 14 identified 97 HCWs with Ebola. Among the 97 HCW cases, the most common occupation was nurse or nurse aide (35%), followed by physician or physician assistant (15%); other occupations included laboratory technicians, cleaners and hygienists, administrators, midwives, dispensers, and security personnel (Table 1). Most of these Ebola cases occurred in HCWs employed at hospitals (60%). However, all types of health care settings (including public and private) experienced cases of Ebola among HCWs, from the smallest clinics, which have catchment areas of <3,500 persons and are open Monday through Friday without inpatient services, to larger regional hospitals, which have catchment areas of three to five counties and are expected to be open 24 hours a day with at least a 100-bed capacity (*6*).

Among the 97 HCW cases, 11 clusters of Ebola occurred (10 in non-ETU facilities and one in an ETU) during June 9–August 14 in four counties (Bong, Lofa, Margibi, and Montserrado) (Figure). The one cluster involving HCWs who worked primarily in an ETU and triaged patients from an associated hospital has been described previously (*7*). Among the remaining 10 clusters that occurred in non-ETU health care facilities, the number of cases ranged from two to 22 HCWs per cluster (median = five HCWs). Included in these 10 clusters were 62 (64%) of the 97 HCWs with Ebola identified overall (Table 2). Of the 62, a total of 50 (81%) had confirmed Ebola, and 31 were known to have died. Seven of 10 HCW clusters were primarily associated with hospitals. One cluster included HCWs in two clinics and a hospital; a single source patient visited all three locations while ill. The remaining two clusters occurred among HCWs who worked in two separate clinics.

Of the 62 HCWs involved in the 10 clusters, 33 were identified as having cared for the source patient in the cluster. Examples of reported high-risk exposures among the infected HCWs included a spill of infected patient blood onto the uncovered skin of a phlebotomist and medical care provided by HCWs not using adequate PPE when caring for a fellow HCW who was ill with what was thought to be heart failure, but later was diagnosed as Ebola. Additionally, possible high-risk exposure occurred by direct physical contact of two HCWs with an infected patient whom the HCWs had assisted into the hospital. In two of the clusters, the source patients were HCWs who had reportedly cared for infected patients at home, outside of their regular job duties. Four HCWs among three of the 10 clusters had no known or identified unprotected physical contact with patients with Ebola, but worked in health facilities where patients with Ebola had been treated. For example, an HCW who served as the officer-in-charge of an outpatient department was infected. This HCW had no direct contact with the source patient, but had worked closely with many of the HCWs who developed secondary cases.

In four of the 10 clusters, the source patients were suspected of having Ebola when initially examined, based on history and clinical symptoms. However, in four other clusters, the source patient was initially thought to have another disease (e.g., dysentery, cholera, Lassa fever, or heart disease). In one of these four clusters, the source patient had a known history of heart disease and did not disclose a history of Ebola virus exposure leading to a delay in diagnosis. In another cluster, details of testing are unclear, but the source patient was not confirmed to have Ebola virus until at least 12 days after developing symptoms. Of the remaining two clusters, a source patient could not be identified in one cluster, and investigation of the other was incomplete because five HCWs had died and the health facility director could not be contacted

Visits to six of the 10 non-ETU health care facilities where clusters occurred revealed that materials and setup required for implementing adequate infection control precautions often

TABLE 1. Number of cases (suspected, probable, and confirmed) of Ebola virus disease among persons identified as health care workers, by occupation and type of facility where workers were employed — Liberia, June 9–August 14, 2014*

Occupation/Facility	No.	(%)
Occupation		
Nurse	23	(24)
Nurse aide	11	(11)
Physician	10	(10)
Laboratory technician	8	(8)
Physician assistant	7	(7)
Cleaner/Hygienist	5	(5)
Dispenser	3	(3)
Health or surveillance officer	3	(3)
Midwife	3	(3)
Clergy	2	(2)
Vaccinator	2	(2)
Administrator	1	(1)
Security	1	(1)
Unknown	18	(19)
Total	**97**	**(100)**
Facility		
Hospital	58	(60)
Clinic	19	(20)
Ebola treatment unit	3	(3)
Health center	1	(1)
Mobile clinic	1	(1)
Public health office	1	(1)
Unknown	14	(14)
Total	**97**	**(100)**

* Information on health care worker occupations and facilities was compiled from health care cluster investigations and the Liberian Ministry of Health national Ebola surveillance system.

were not available. These included adequate chlorine, running water, cleaning supplies, hand washing stations, adequate types and supplies of PPE, and isolation areas. In instances where limited PPE was available, equipment was shared or reused. At one hospital visit, it was reported that multiple HCWs consecutively donned and doffed the same pair of single-use gloves to care for a patient with Ebola. Alternatively, some HCWs were noted to be wearing the same PPE throughout their shift while caring for Ebola and non-Ebola patients. Isolation areas existed at five of the six health facilities visited where there were clusters of Ebola among HCWs, but were inadequate. For example, at one hospital, a single occupancy room within the emergency department was used for isolation but was quickly overwhelmed when the facility admitted multiple patients with Ebola in a week. The isolation areas were rudimentary, lacking toilet facilities, running water, and physical separation from other patient treatment areas.

Discussion

These infections demonstrate the risk associated with caring for Ebola patients without adequate infection control. Individual cases and clusters of Ebola continued to occur among HCWs working in non-ETU health care facilities in

TABLE 2. Characteristics of identified clusters of Ebola virus disease among health care workers in health care facilities that were not Ebola treatment units — Liberia, June 9–August 14, 2014

Characteristic	No.
Total number of cases	**62**
Confirmed cases (Deaths)	50 (31)
Health care workers per cluster	2–22 (median = 5)
Clusters in health care facilities that were not Ebola treatment units	10
Hospitals with a cluster of Ebola among health care workers	8
Clinics with a cluster of Ebola among health care workers	4

Liberia during the period covered by this investigation, reflecting ongoing transmission and the increasing burden of Ebola in the community. Nurses and nurse aides were most commonly infected, although cases of Ebola among HCWs in all occupations, both clinical and nonclinical, were observed. By early August, many of the health care facilities in Liberia were either functionally or officially closed because of inability to maintain staffing as a result of HCW illnesses and departures and patient avoidance of facilities where Ebola patients had been treated.

Inadequate infection control infrastructure, including inadequate protocols, training, materials, and setup contributed to Ebola virus exposure in the non-ETU health care settings described in this report. Supplies of PPE were insufficient across Liberia and, when available, often were not adequate or improperly used. During the course of this investigation, many health care facilities closed; however, preparation for reopening closed health facilities was under way, including training for infection prevention and control. As conditions of reopening, HCWs not only requested training, but also a consistent supply of adequate PPE.

Early recognition, triage, and isolation of all potential Ebola cases are essential so that adequate infection control measures can be applied and transmission of Ebola virus limited. Ebola symptoms are similar to those of many other diseases, and recognition is difficult when not initially suspected. In Liberia, Ebola should be considered in all patients with fever or other symptoms because of 1) the relatively high incidence of the disease; 2) ongoing opportunities for acquisition through direct contact with body fluids of symptomatic or deceased patients during patient care, handling of a dead body, or environmental contact with body fluids; 3) variable reliability of patient reports of their risk factors; and 4) difficulties in contact tracing, including limited availability and timeliness of laboratory testing. After triaging possible cases, patients should be isolated with adequate infection control measures (*3*). As demonstrated in these clusters, inaccurate illness and exposure histories and difficulties in making a clinical diagnosis can result in additional exposures. These factors make it critical that all HCWs, both clinical and nonclinical, who might encounter

What is already known on this topic?

Human-to-human transmission of Ebola virus disease (Ebola) can occur through direct contact with body fluids of symptomatic or deceased patients. Health care workers (HCWs) are at greater risk for Ebola, accounting for up to 25% of cases in previous outbreaks. These risks can be mitigated by triage protocols, adherence to strict infection control guidelines, and adequate provisions and use of personal protective equipment. Strong infection control is essential to breaking the chain of transmission of Ebola virus.

What is added by this report?

During June 9–August 14, 2014, a review of national data and field investigations identified 97 cases of Ebola among HCWs in Liberia, 62 of which occurred in 10 clusters in health care facilities not dedicated to treating Ebola patients, primarily hospitals. Individual cases and clusters of Ebola among HCWs occurred most often among nurses, nurse aides, and physicians. However, there were cases of Ebola among HCWs in all occupations and health care settings. Infrastructure for adequate infection control was lacking.

What are the implications for public health practice?

To avoid the acquisition of Ebola among HCWs, especially in the health care setting, and the subsequent undermining of the epidemic response, a strong infection control infrastructure is needed. Working towards this, the Liberian Ministry of Health and Social Welfare in collaboration with a consortium of partners has initiated a major program to improve infection prevention and control at health care facilities. This program emphasizes rapid recognition and triage, appropriate training in the use of and adequate supply of personal protective equipment, and identification of a structure for the supervision of consistent and appropriate infection control adherence.

infected patients or contaminated environments or materials, have access to and adhere to infection control measures.

Direct physical contact with the body fluids of infected patients while at work continues to be a clear risk factor, but exposures outside the health care setting also were noted (i.e., the two HCW source patients who had cared for infected patients at home). With many facilities closed and ongoing community transmission, HCW risks for acquiring Ebola in the community exist. Additionally, although no HCW-to-patient or patient-to-patient transmissions were identified because this investigation was limited to infected HCWs, patients likely also had direct physical contact with other patients and environmental exposures to Ebola virus in these health care settings.

The findings in this report are subject to at least four limitations. First, collection of data on exposure history and infection control practices was limited by deaths and illness among HCWs from Ebola (31 deaths at the time of the investigation, with other HCWs critically ill), a lack of coworker proxies to provide history for many of the cases, and the closure of health facilities, which made it difficult to locate HCWs. Second, infection control practices were not systematically observed, and reports might have been affected by recall bias. Third, exposure histories were difficult to evaluate because multiple cases of Ebola were treated simultaneously by individual HCWs and there also was the potential for environmental exposure in the work place and community exposures. Finally, evaluation of exposure and disease transmission contacts was limited by the lack of contact lists in eight clusters and incomplete contact lists in the other two.

The immediate consequences of Ebola among HCWs, especially when occurring in clusters at individual facilities, are the closure of health facilities, loss of routine services, grief and fear among HCWs, and public mistrust of HCWs and health facilities, all of which might undermine the epidemic response. The long-term consequences include the loss of a sufficient and experienced HCW work force to provide health services and educate future HCWs. Both the immediate and long-term consequences are likely to result in increased non-Ebola morbidity and mortality.

Effective isolation is at the core of a robust Ebola response and cannot be performed without strong infection control in a functioning health care system. Strong infection control is essential to breaking the chain of transmission of the Ebola virus, which is necessary in reestablishing routine health care in Liberia. To begin to accomplish this, there needs to be recognition and triage of potential cases of Ebola, appropriate training in the use of and adequate supply of personal protective equipment, and identification of a structure for the supervision of consistent infection control adherence.

Since August, collaborative efforts to strengthen infection control infrastructure in non-ETU health facilities have been undertaken by a consortium of partners working with the Liberian Ministry of Health and Social Welfare. These efforts included developing national guidance for infection control standards necessary to deliver health services. A training program on infection control, including triage and isolation of suspected Ebola cases, appropriate use of PPE, and environmental hygiene, has been initiated for HCWs of all occupational types working in all levels of the health care system throughout Liberia. Importantly, a culture of infection prevention will be emphasized by identifying infection control specialists who will be embedded in non-ETU health facilities to supervise adherence to infection control practices. These efforts to implement, assess, and improve infection control in non-ETU health care settings are an ongoing and essential component of the response.

Acknowledgments

Health care workers in Liberia; West Africa Ebola national and international response teams; the Ministry of Health and Social Welfare, Republic of Liberia.

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Ebola Epidemic — Liberia, March–October 2014

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On November 14, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr). Errata for this report are included in the current (November 21, 2014) issue.*

On March 21, 2014, the Guinea Ministry of Health reported the outbreak of an illness characterized by fever, severe diarrhea, vomiting and a high fatality rate (59%) (*1*), leading to the first known epidemic of Ebola virus disease (Ebola) in West Africa and the largest and longest Ebola epidemic in history. As of November 2, Liberia had reported the largest number of cases (6,525) and deaths (2,697) among the three affected countries of West Africa with ongoing transmission (Guinea, Liberia, and Sierra Leone) (*2*). The response strategy in Liberia has included management of the epidemic through an incident management system (IMS) in which the activities of all partners are coordinated (*3*). Within the IMS, key strategies for epidemic control include surveillance, case investigation, laboratory confirmation, contact tracing, safe transportation of persons with suspected Ebola, isolation, infection control within the health care system, community engagement, and safe burial. This report provides a brief overview of the progression of the epidemic in Liberia and summarizes the interventions implemented.

The data sources used to describe the epidemic included aggregate situation report data reported daily from counties to the Liberian Ministry of Health and Social Welfare (MOHSW), data from Ebola treatment units (ETUs), and Ebola laboratory test data. Case definitions used by the Liberian MOHSW have been described previously (*4*). Field investigative reports from rapid response teams deployed in 12 counties during October 25–November 5 also were reviewed.

ETU admission records included all patients admitted to ETUs in Liberia. Non-Ebola patients were defined as those admitted to ETUs but released based on documentation of two consecutive negative Ebola reverse transcription–polymerase chain reaction (RT-PCR) tests at least 72 hours apart. Ebola cases were defined as illnesses in patients who did not have documentation of a negative RT-PCR test result even if laboratory results were not recorded (i.e., including confirmed [those with ETU documentation of a positive RT-PCR result], and those probable and suspected Ebola patients for whom there were no ETU documentation of negative RT-PCR results). Seven percent of Ebola cases did not have laboratory results.

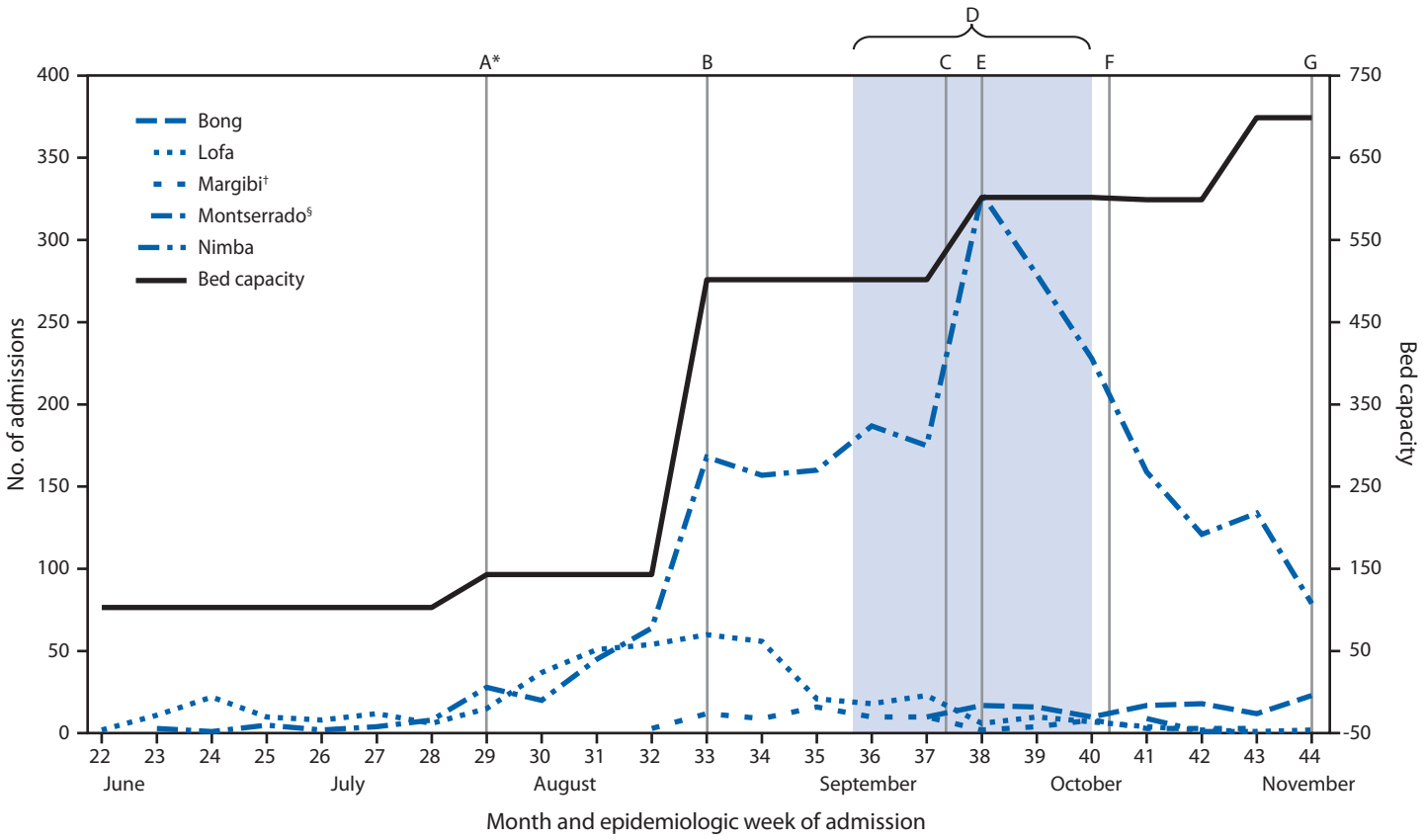
Confirmation of Ebola in the laboratory was undertaken by real-time PCR by one laboratory in Lofa County, three laboratories in Montserrado County, and one laboratory in Bong County. Results were available for 7,043 specimens representing 5,132 patients. Because patient-level identifiers were not assigned consistently, a unique identifier was created using patient initials, sex, age, and home location to link multiple specimen records for the same patient. A total of 413 specimens (<6%) lacked the information necessary for unique identifier assignment and were excluded. Test week was based on the first specimen taken. Information on the number of safe burial teams trained and operational, by county, was obtained from Global Communities and the International Federation of Red Cross and Red Crescent Societies, nongovernmental organizations (NGOs) contracted to collect human remains.

In March 2014, Ebola virus infection was detected in Lofa County in a patient returning from an outbreak area in Guinea. During March–October, 2014, Liberia counties reported 2,445 suspected, 1,623 probable, and 2,456 confirmed Ebola patients to MOHSW. In the months following detection in Lofa, the county experienced multiple waves of outbreaks, with a peak in case counts between late July and late September (Figure 1). In June 2014, the first cases were detected in densely populated Montserrado County (estimated pop. 1.5 million), leading to a countywide outbreak that peaked in late September, followed by a rapid decrease in the Ebola case counts since that time. Concurrent with the Montserrado County outbreak, cases were identified from all counties in Liberia, with 12 of 15 counties reporting cases to MOHSW during October 25–November 3 (Figure 2).

As the Lofa outbreak expanded, many suspected Ebola patients sought assistance within the national health care system, leading to multiple outbreaks among health care workers throughout the country (*5*). Many health care facilities closed, and health care workers refused to come to work. Those facilities that remained open provided limited care. As of November 8, MOHSW reported 329 health care workers infected with Ebola.

Providing care to this large number of patients has been a challenge. In April, MOHSW with support from Médecins Sans Frontières (MSF) established an isolation facility at an old

FIGURE 1. Number of patients admitted to Ebola treatment units (ETUs), by county and week — Liberia, June 5–November 1, 2014



Abbreviation: ETU = Ebola treatment unit.

* A) opening of ELWA2 ETU, B) opening of ELWA3 ETU and JFK ETU, C) opening of Bong ETU, D) safe burial teams trained and deployed in all counties, E) opening of Island Clinic ETU, F) opening of Nimba ETU, G) opening of MoD ETU. Not shown: openings of ELWA 1 ETU (April 2014), Margibi ETU (April 2014), and Lofa ETU (April 2014).

† Margibi ETU opened in April but had no cases until August 8. No data were reported for October 1–21, 2014.

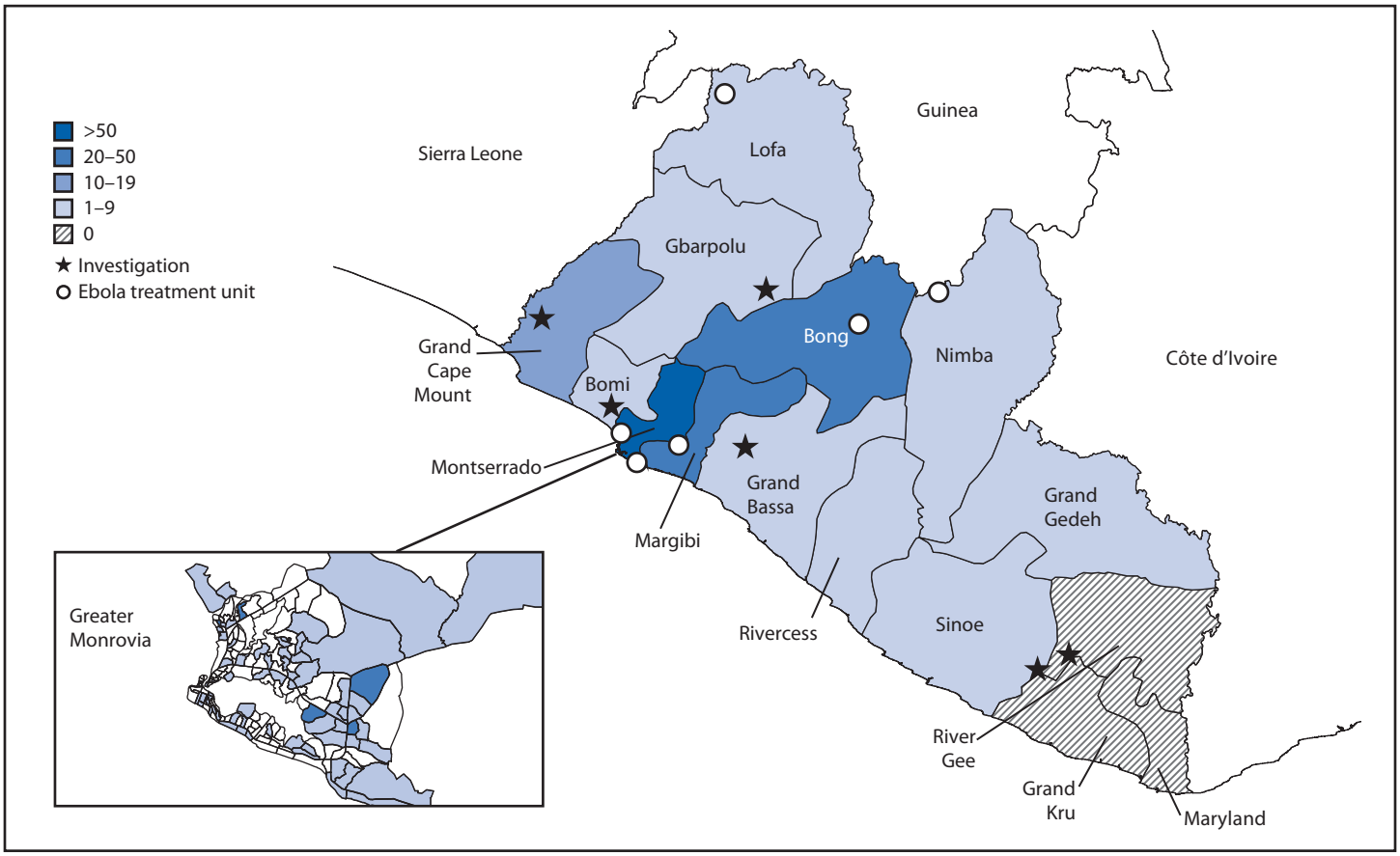
§ Includes JFK, Island, ELWA-2, ELWA-3, and MoD ETUs.

refugee transit facility in the town of Foya, where the disease was first detected. The Firestone company established a 23-bed unit in April in Margibi county (*4*). In Montserrado, an NGO converted a hospital chapel (ELWA1) into an isolation facility. After health care workers on staff had acquired infections, the NGO withdrew from Liberia, and management of the facility was transferred to MSF and the Liberian government. As the outbreak intensified in Montserrado in July, patients from ELWA1 were moved to an outpatient department (ELWA2) within the hospital grounds. With an overwhelming demand for beds, the government converted a cholera ward at JFK Hospital into a treatment unit while MSF started construction on a new site, ELWA3, which opened August 17. The initial admissions to this unit included a large number of critically ill patients who were waiting outside the ETUs seeking care.

In response to the continued demand, the government, the World Health Organization, and the World Food Programme began construction on two additional ETUs in Monrovia, and the partners began planning construction on multiple ETUs throughout the country. In collaboration with Save the Children, the International Medical Corps opened the Bong County ETU on September 15. Island Clinic ETU was opened as a 120 bed unit on September 21 and was immediately filled with approximately 200 patients. The Liberian Ministry of Defense ETU opened as a 100-bed unit on November 6 (Figure 1). By November 8, there were a total of 697 beds available in nine ETUs in Liberia. During June 5–November 8, 2014, a total of 4,025 patients were admitted to ETUs in Liberia; 2956 were classified as having Ebola (73.5%).

To prevent transmission associated with funeral practices, safe burial teams were trained in all counties, beginning in Lofa with the opening of the Foya ETU, followed by training of burial teams in Montserrado. Despite reported community resistance, the government implemented a program to

FIGURE 2. Number of suspected and probable Ebola cases from MOHSW daily situation reports and locations of rapid response investigations,* by county, with inset showing case distribution in greater Monrovia — Liberia. October 25–November 3, 2014



Abbreviation: MOHSW = Liberian Ministry of Health and Social Welfare.

* Grand Cape Mount County (Jene Wonde): 24 unexplained deaths; most recent probable or confirmed case on November 5; Grand Kru County (Parluken and Niaplapko): 21 deaths and 14 probable or confirmed cases; most recent probable or confirmed case on November 3; Grand Bassa County (John Logan Town): 17 unexplained deaths including two confirmed Ebola cases and one probable case; most recent confirmed case on October 25; Gbarpolu County (Geleyansiesu) : Six probable and 12 confirmed cases, including eight deaths, most recent confirmed case on November 6; Bomi County (Dorley-La and Gbah): Three confirmed and four probable cases, including five deaths; most recent confirmed case on November 3; Sinoe County (Government Camp): Three confirmed cases since October 31.

cremate all remains in Montserrado County in response to the large number of human remains. In September, there was a significant expansion of safe burial teams in counties, with 54 teams trained and equipped nationwide by October 5, up from fewer than 10 in August.

From October 25 to November 3, MOHSW field teams initiated seven rapid response investigations outside of Montserrado County in hard-to-reach areas (Figure 2). These responses involved the critical support of international partners including the World Health Organization, United Nations Children's Fund, Emergency-Health, Peace Corp staff, and CDC. These investigations represented increased recognition of ongoing outbreaks in hard-to-reach areas, and also reflected ongoing transmission of Ebola in Grand Cape Mount, Grand Kru, Grand Bassa, Gbarpolu, Bomi, and Sinoe counties within a recent 1-week window. Many of the communities are remote, with three not accessible by road. Activities to interrupt transmission in these areas include the rapid establishment of triage and isolation strategies to treat patients in place (in remote areas) or to transport patients to the nearest ETU. Response teams also worked to enhance contact tracing and active surveillance, social mobilization, and infection control practices.

In June and July, <50 specimens were tested per week, with the proportion of specimens testing positive ranging from 30% to 70%. With increases in laboratory capacity, the number of specimens tested increased to approximately 500 per week through August and early September. The peak number of specimens tested occurred in late September and early October at approximately 700 per week with approximately 70% of specimens testing positive at that time. Despite increases in laboratory capacity, there has been a decrease in the number of tests performed since September 28. Overall, out of 5,132

What is already known on this topic?

The current Ebola epidemic in West Africa is the largest ever reported, and Liberia has experienced the largest number of cases. Previous outbreaks of Ebola have been controlled through early identification of cases through contact management and health care system preparedness, isolation and treatment of patients, social mobilization, and safe burials.

What is added by this report?

Data from Ebola treatment units, laboratories, and daily situation reports were analyzed to describe the course of the epidemic in Liberia and the recent geographic distribution of cases. There has been a decrease in cases since mid-September, and the initiation of interventions might have played an important role in the decline. However, Ebola continues to spread in at least 12 of 15 Liberian counties and focal outbreaks in hard-to-reach areas are now frequent.

What are the implications for public health practice?

Although Ebola cases are declining in Liberia, the increased geographic distribution of cases along with outbreaks in remote areas are likely to require an increase in the level of intervention before Ebola can be eliminated.

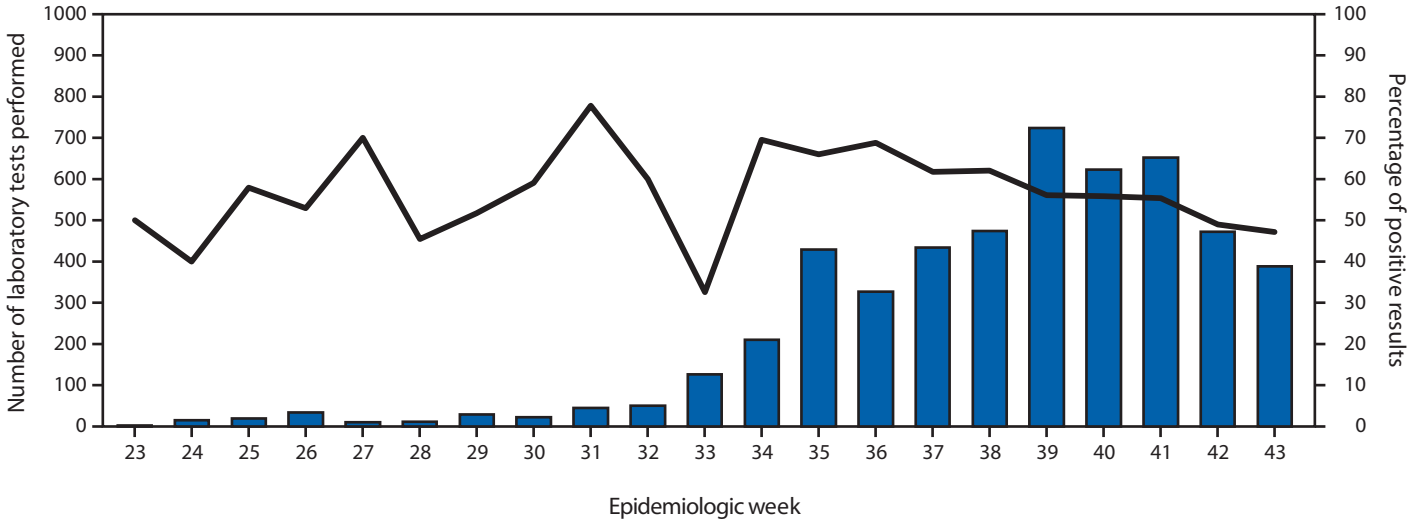
patients who could be identified from the laboratory data, 2,941 (57.3%) tested positive (Figure 3).

Discussion

The outbreak of Ebola in Liberia is complex and evolving. Trends in this analysis are based on ETU admissions and laboratory data and might underestimate case counts among persons who do not get tested, among persons who do not seek care in ETUs, and among persons in areas without ETUs. Given these limitations, the available data indicate Liberia and its partners have made significant strides in possibly reducing Ebola transmission in at least Lofa and Montserrado counties. In particular, there has been a significant decline in case counts with increased bed capacity, safe patient transport, training of burial teams, and ongoing social mobilization and community-led interventions. However, progress of control efforts is tenuous and will require rapid response to multiple outbreaks, improved infection control throughout the health care system, and extensive community engagement to stop transmission. The widespread distribution of disease in urban and rural settings coupled with a highly mobile population, presents extraordinary challenges. Intensified case identification and contact tracing efforts are needed in all counties while sustaining current interventions and refining control strategies to stop transmission in other counties.

Controlling the epidemic in counties outside of Monrovia will require construction of ETUs in all counties, along with increases in capacity for specimen transport and testing networks. Early case recognition, identification, and isolation, along with contact identification and management, are needed to rapidly contain focal outbreaks in hard-to-reach and newly affected areas. Addressing these focal outbreaks will demand intensified and flexible support, including special attention to social mobilization and community engagement. These increases in response activities must counter any potential relaxation of control measures within the IMS response and will require an effective surveillance system and continued support from the international community. Adapting control strategies to the epidemic and rapidly expanding response activities are essential to prevent endemic Ebola transmission and international spread.

FIGURE 3. Number of laboratory tests performed and percent positive for Ebola, by week — Liberia, June 5–November 1, 2014.



[1]Ministry of Health and Social Welfare, Liberia; [2]World Health Organization; [3]United Nations Children's Fund; [4]Médecins Sans Frontières; [5]International Medical Corps; [6]US Navy; [7]National Institutes of Health; [8]US Army Medical Research Institute of Infectious Diseases; [9]CDC (Corresponding author: Frank Mahoney, fmahoney@cdc.gov, 404-718-6833).

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Morbidity and Mortality Weekly Report

Ebola Virus Disease Cluster in the United States — Dallas County, Texas, 2014

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Since March 10, 2014, Guinea, Liberia, and Sierra Leone have experienced the largest known Ebola virus disease (Ebola) epidemic with approximately 13,000 persons infected as of October 28, 2014 (*1,2*). Before September 25, 2014, only four patients with Ebola had been treated in the United States; all of these patients had been diagnosed in West Africa and medically evacuated to the United States for care.

On September 25, a man aged 45 years (patient 1), who had arrived in the United States from Liberia 5 days earlier, went to a Dallas County, Texas, emergency department with fever, initially 100.1°F (38.4°C) but increased to 102.9°F (39.4°C), abdominal pain, and headache (Figure). He was treated for possible sinusitis and discharged. On September 28, the man returned to the hospital by ambulance with persistent fever (101.4°F [38.6°C]), abdominal pain, and new onset diarrhea; he was placed in a private room under standard, droplet and contact precautions and was tested for Ebola. On September 30, real-time polymerase chain reaction (PCR) testing at the Texas Department of State Health Services and CDC confirmed that patient 1 was positive for Ebola virus, and this represented the first imported Ebola virus infection diagnosed in the United States. A CDC team arrived in Dallas later that night by invitation from the Texas Department of State Health Services to assist with its investigation. The objectives were to 1) identify potentially exposed contacts of the Ebola patient, 2) initiate monitoring of contacts, 3) review plans for triaging and testing suspected Ebola patients, and 4) review infection control practices.

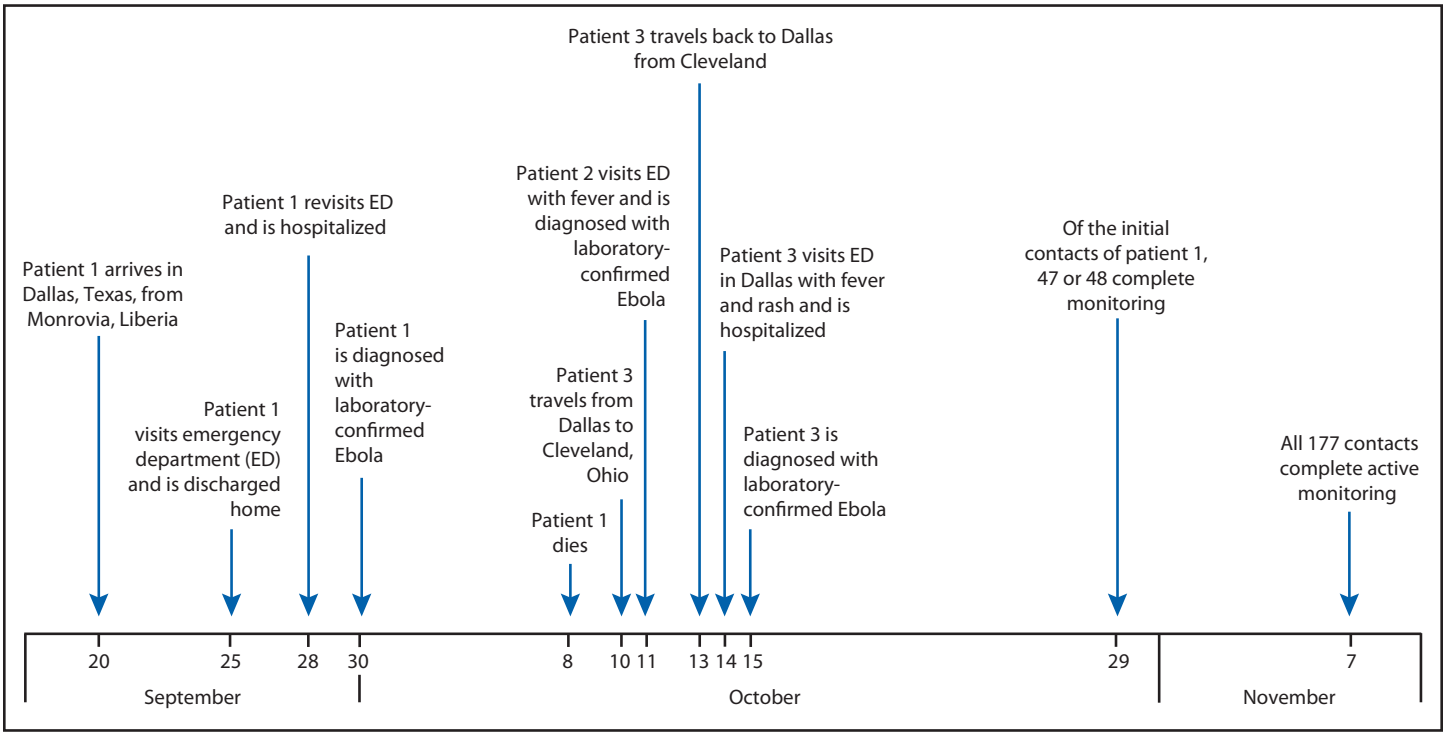
Initial tracing of potentially exposed contacts (i.e., "contact tracing") identified 48 close, unprotected contacts (i.e., had exposure to the patient, a potentially contaminated environment, or patient specimens without minimum recommended personal protective equipment [PPE]). Of the 48 contacts, 17 were persons within the community with exposure to the patient before he was admitted to the hospital and while he was symptomatic, 10 were persons who had been transported in the same ambulance that had transported the patient before it was completely cleaned and disinfected, and 21 were health care workers (HCWs) with potential exposures to body fluid without the protection of complete PPE. Beginning October 1, all 48 contacts underwent direct active monitoring (one in-person and one telephone follow-up per day to check for fever or symptoms of Ebola) for 21 days (the upper limit of the Ebola incubation period) from their last exposure date; six close community contacts were quarantined. Patient 1 died on October 8.

On October 11, a nurse (patient 2) previously involved in direct care of patient 1 developed fever (100.6°F [38.1°C]) and sore throat; she was confirmed to have Ebola by real-time PCR later that day. On October 14, a second nurse (patient 3) with similar exposure had a fever (100.5°F [38.1°C]) and rash and was confirmed to have Ebola by real-time PCR on October 15. Before her diagnosis, patient 3 had visited Ohio during October 10–13 (*3*). Contact tracing of patients 2 and 3 identified three household contacts of the two patients. Additional community contacts of patient 3 were identified from the Ohio visit and have been described (*3*).

Because patients 2 and 3 had used PPE during their care of patient 1 without reported exposures, all HCWs with any contact with any of the three Ebola patients, their laboratory specimens, or potentially contaminated environmental surfaces were interviewed beginning on the morning of October 12. All 147 HCW contacts of any of the patients, irrespective of PPE use, were actively monitored from October 12 until 21 days from their last exposure to an Ebola patient; those HCWs who had ever been in any of the three patients' rooms were instructed not to use any long-distance and local public conveyances, and those who had ever been in patient 1's room were additionally instructed not to attend mass gatherings (e.g., religious services). A subset of 20 HCWs volunteered to quarantine themselves.

In addition to contact tracing and monitoring, the Dallas Ebola investigation team 1) conducted technical consultations with five Dallas area hospitals to assist them in planning for providing care for confirmed Ebola patients; 2) established an emergency medical services transportation plan for known or suspected Ebola patients; 3) developed a plan for safely handling Ebola patient remains; 4) established capacity for PCR Ebola testing to be conducted at the Dallas County public health laboratory; 5) trained 160 HCWs on PPE use (e.g., proper selection and supervised donning and doffing) and infection control practices appropriate for caring for Ebola

FIGURE. Timeline of events for Ebola patients 1, 2, and 3 — Dallas, Texas, September 20–November 7, 2014



patients; and 6) helped establish a triage unit for evaluating contacts with symptoms compatible with Ebola. During this investigation, CDC developed new infection control guidance* and new guidance for assessing the risk of potential Ebola exposure.† By November 7, all 177 contacts of patients 1, 2, and 3 (some persons were contacts of more than one patient) completed 21 days of monitoring. In addition to patients 2 and 3, 12 persons who had contact with one or more of the Ebola patients were tested for Ebola after they developed fever or other symptoms potentially compatible with the disease during their monitoring period. Active monitoring aided in the prompt identification and evaluation of these contacts. None of those evaluated were found to have Ebola.

The Dallas Ebola cluster highlights many important issues that might be encountered by other jurisdictions in which an Ebola diagnosis is made locally, and for which jurisdictions should plan, including the need to 1) identify patients with Ebola at presentation to minimize potential exposures, 2) rapidly identify contacts of Ebola patients and evaluate their level of exposure risk, 3) monitor potentially large numbers of community and health care contacts, 4) assess infection control practices and conduct large-scale training sessions, 5) develop protocols to safely transport suspected Ebola patients to hospitals and safely evaluate these patients within a hospital, and 6) designate facilities to care for patients with confirmed Ebola.§

*Available at http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html.

†Available at http://www.cdc.gov/vhf/ebola/exposure/monitoring-and-movement-of-persons-with-exposure.html.

§Additional information available at http://www.cdc.gov/vhf/ebola.

Acknowledgments

Dallas County Ebola Response Team and LRN Laboratory. Texas Department of State Health Services. Ebola Team, CDC Dallas Ebola Investigation Team.

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Response to Importation of a Case of Ebola Virus Disease — Ohio, October 2014

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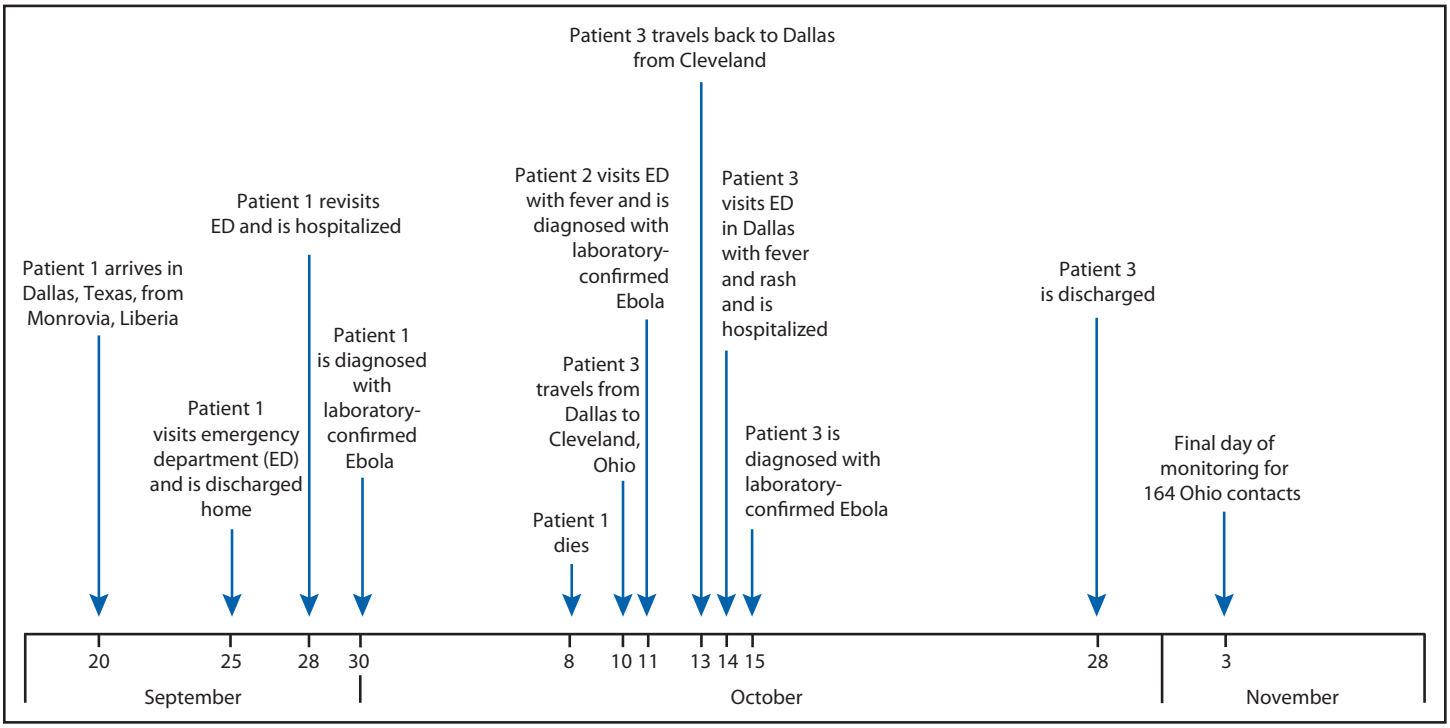
On November 14, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

On September 30, 2014, the Texas Department of State Health Services reported a case of Ebola virus disease (Ebola) diagnosed in Dallas, Texas, and confirmed by CDC, the first case of Ebola diagnosed in the United States (*1*). The patient (patient 1) had traveled from Liberia, a country which, along with Sierra Leone and Guinea, is currently experiencing the largest recorded Ebola outbreak (*2*). A nurse (patient 2) who provided hospital bedside care to patient 1 in Texas visited an emergency department (ED) with fever and was diagnosed with laboratory-confirmed Ebola on October 11 (*1*), and a second nurse (patient 3) who also provided hospital bedside care visited an ED with fever and rash on October 14 and was diagnosed with laboratory-confirmed Ebola on October 15. Patient 3 visited Ohio during October 10–13, traveling by commercial airline between Dallas, Texas, and Cleveland, Ohio (Figure). Based on the medical history and clinical and laboratory findings on October 14, the date of illness onset was uncertain; therefore, CDC, in collaboration with state and local partners, included the period October 10–13 as being part of the potentially infectious period, out of an abundance of caution to ensure all potential contacts were monitored. On October 15, the Ohio Department of Health requested CDC assistance to identify and monitor contacts of patient 3, assess the risk for disease transmission, provide infection control recommendations, and assess and guide regional health care system preparedness. The description of this contact investigation and hospital assessment is provided to help other states in planning for similar events.

The movements and activities of patient 3 were identified and confirmed through interviews with the patient and close contacts, social media, press releases, and an airport/airline investigation. During her time in Ohio, patient 3 had contact with two household members (one of whom was interviewed and monitored in Texas after traveling there and is not included in the number monitored in Ohio) as well as contact with 10 friends and family members and 60 patrons and employees at one store. Seventeen airline and airport personnel and 76 airline passengers also were monitored in Ohio because of contact with patient 3. Some exposures were brief, whereas others lasted several hours; some likely included direct skin-to-skin exposure. Contacts were interviewed to determine risk for exposure and monitored by local health jurisdictions in Ohio, with the majority of contacts residing in metropolitan areas near Cleveland and Akron. All 164 Ohio contacts were asked to monitor their temperature and symptoms twice a day for the 21-day incubation period. Based on Ohio's risk stratification, which was similar but slightly more restrictive than CDC's *Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure* (*3*), 50 contacts who had no direct contact and were not within a 3-foot (1-meter) radius of the patient but were in the same enclosed space for less than an hour self-monitored only; 94 contacts who similarly had no direct contact and were not within a 3-foot radius but had a more prolonged period in the same enclosed space with the patient self-monitored and reported the results once daily to local public health officials; 20 contacts who were within a 3-foot radius of the patient and in the same enclosed space for 1 hour or more were directly actively monitored through twice-daily check-ins from local public health officials (once in person and once by phone). All 20 contacts under direct active monitoring had movement restrictions, including three who were under home quarantine because they reported household or likely direct skin-to-skin contact with the patient. Contacts were, in general, cooperative with monitoring, but there were extensive efforts required to ensure continuity of monitoring because many contacts were identified as a contact in one health jurisdiction (e.g., airport location) and had to be transferred to another health jurisdiction for daily monitoring based on their residence. As of November 3, the end of the 21-day incubation period and the final day of monitoring, no additional Ebola-infected patients had been identified, and none of the 164 monitored contacts had reported Ebola symptoms that resulted in testing.

Onsite technical consultations were conducted rapidly with seven hospital systems across the northeast Ohio region, identified by local health jurisdictions, to assess preparedness to care for a contact who developed symptoms of Ebola. All seven hospitals were determined to have capacity for isolation and transfer of a patient with suspected Ebola; five were deemed fully capable of providing care during the 72-hour

FIGURE. Timeline of events relevant to diagnosis of Ebola virus disease (Ebola) in patient 3 — Ohio and Texas, September 20–November 3, 2014



Ebola evaluation period.* During the response, local health jurisdictions developed plans to coordinate emergency medical services transport of a patient who developed Ebola-like symptoms to minimize exposure of first responders and to direct the patients to appropriate facilities with personnel who were trained and prepared to accept these patients. Recognition of factors that could limit a hospital's ability to provide Ebola patient care has prompted discussions about implementing a regional collaboration among health care systems to enable resource sharing to extend capacity.

This response required substantial time, resources, and coordination between local health jurisdictions in 19 Ohio counties, the state health department, federal public health authorities, and the regional health care system. This response highlighted the need for specific plans to be developed in advance for various potential situations, including identification of screening facilities for the triage of persons under investigation if the designated Ebola treatment facility reaches capacity†; identification of emergency medical services to transport persons under investigation safely to the nearest screening or treatment facility; identification and monitoring of large numbers of contacts; and following up on difficult-to-reach contacts to ensure their symptoms are monitored daily. Future responses could benefit from sharing of best practices from Ohio's response, such as working with the state or local health department to mobilize staff to monitor large numbers of contacts and the daily posting of the number of contacts being monitored in each risk stratification category on the Ohio Department of Health website to facilitate communication with the public during a time of high public anxiety.

*Additional information available at http://www.cdc.gov/vhf/ebola/hcp/considerations-discharging-pui.html.

†Additional information available at http://www.cdc.gov/vhf/ebola/hcp/case-definition.html.

Acknowledgments

Kim Quinn, Brian Fowler, Ohio Ebola Epidemiology Response Team, Ohio Department of Health. Anne Morse and response staff at Summit County Public Health. Response staff at Cuyahoga County Board of Health, Cuyahoga County Emergency Management, and University Hospitals Case Medical Center Preventive Medicine Residents. Ed Eckhart, Nicole Carlton, and response staff at Cleveland City Health Department. Other county and city health departments, Ohio. Dallas County Health and Human Services Ebola Epidemiology Response Team. Tina Objio, Robynne Jungerman, CDC Ebola Outbreak Response Global Migration Task Force. Lyn Finelli, Teresa Seitz, Kristen Nordlund, CDC Ebola Response Team.

[1]Epidemic Intelligence Service, CDC; [2]Ohio Department of Health; [3]CDC Ebola Response Team, Ohio; [4]Summit County Public Health; [5]Cuyahoga County Board of Health; [6]Cleveland City Health Department; [7]CDC Ebola Outbreak Response Global Migration Task Force (Corresponding author: Carolyn L. McCarty, clmccarty@cdc.gov, 614-728-6941)

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Announcements

Expansion of VariZIG distribution in the United States

In July 2013, CDC published updated recommendations for the use of VariZIG for postexposure prophylaxis of varicella for persons at high risk for severe disease who lack evidence of immunity to varicella and for whom varicella vaccine is contraindicated (*1*). At the time of the recommendation, VariZIG was available from only one U.S. distributor (FFF Enterprises; Temecula, California; telephone, 800-843-7477; online at http://www.fffenterprises.com). Now, VariZIG is also available from a second distributor (ASD Healthcare; Frisco, Texas; telephone, 800-746-6273; online at http://www.asdhealthcare.com).

Reference

1. CDC. Updated recommendations for use of VariZIG—United States, 2013. MMWR Morb Mortal Wkly Rep 2013;62:574–6.

Diabetes State Atlas Now Available Online

CDC's Division of Diabetes Translation announces the launch of the Diabetes State Atlas (available at http://www.cdc.gov/diabetes/data), an interactive Internet tool for the public to view maps and charts of diabetes data and trends at the U.S. state level. Some of the features of the atlas include 1) customizable maps and graphics of diabetes surveillance data, 2) an interactive application to view state-specific trends by age and sex, and 3) downloadable maps, charts, and data tables that can be used in grant applications, reports, articles, and publications.

The Diabetes State Atlas can help state public health officials document the burden of diabetes in their states, monitor trends, identify high-risk groups and assess disparities between groups, and track progress in achieving *Healthy People 2020* diabetes objectives (*1*).

In the United States, about 29 million persons have diabetes (*2*). An additional 86 million adults have prediabetes, putting them at increased risk for developing type 2 diabetes, heart disease, and stroke (*2*). However, persons with diabetes can take steps to control the disease and prevent complications, and those with prediabetes can prevent or delay the onset of type 2 diabetes through weight loss and physical activity (*3*). Information about diabetes prevention and control is available online from CDC's Division of Diabetes Translation at http://www.cdc.gov/diabetes/home/index.html.

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Announcement

National Chronic Obstructive Pulmonary Disease (COPD) Awareness Month — November 2014

Chronic obstructive pulmonary disease (COPD) is a respiratory condition that makes it hard to breathe by limiting airflow in and out of the lungs. COPD includes emphysema and chronic bronchitis. Each year, more persons in the United States die from COPD than from stroke, injuries, or diabetes (*1*). The symptoms of COPD include frequent coughing (sometimes called "smoker's cough" if the patient is a current or former smoker), excess phlegm or sputum production, shortness of breath while doing activities the patient used to be able to do, wheezing, and not being able to take a deep breath. The primary cause of COPD in the United States is smoking, but one fourth of patients with COPD have never smoked (*2*). The risk for COPD increases with age and is higher among women than men and among American Indians/Alaska Natives than other ethnic groups (*3*).

November is National COPD Awareness Month. The observance is supported by the National Heart, Lung, and Blood Institute's COPD: Learn More, Breathe Better campaign. This year, the campaign encourages persons who are experiencing COPD symptoms to "Take the First Step" and discuss their symptoms with their physician. Lung function can be evaluated through a simple breathing test called spirometry. Although COPD currently has no cure, it can be treated, making it possible for patients to improve their quality of life.

More information about COPD is available from CDC at http://www.cdc.gov/copd and from the National Heart, Lung, and Blood Institute at http://www.nhlbi.nih.gov/health/educational/copd.

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3. Ford ES, Croft JB, Mannino DM, Wheaton AG, Zhang X, Giles WH. COPD surveillance—United States, 1999–2011. Chest 2013;144:284–305.

Errata

Vol. 63, No. 46

In the report, "Ebola Epidemic — Liberia, March–October 2014," which was first published as an *MMWR* Early Release on November 14, 2004, multiple errors occurred.

The list of authors and their affiliations should read as follows: Tolbert Nyenswah[1], Miatta Fahnbulleh[1], Francis Ketah[1], Moses Massaquoi[1], Thomas Nagbe[1], Luke Bawo[1], James Dorbor Falla[1], Henry Kohar[1], Alex Gasasira[2], Pierre Nabeth[2], Heather Popowitz[3], Sheldon Yett[3], Lindis Hurum[4], Laurence Sailly[4], Sean Casey[5], Benjamin Espinosa[6], Andrea McCoy[6], Heinz Feldman[7], Lisa Hensley[7], Mark Baily[8], Justin Pendarvis[9], Barry Fields[10], Terrence Lo[10], Jin Quin[10], John Aberle-Grasse[10], Kim Lindblade[10], Josh Mott[10], Lucy Boulanger[10], Athalia Christie[10], Susan Wang[10], Joel Montgomery[10], Frank Mahoney[10] (Author affiliations at end of text)·

[1]Ministry of Health and Social Welfare, Liberia; [2]World Health Organization; [3]United Nations Children's Fund; [4]Médecins Sans Frontières; [5]International Medical Corps; [6]U.S. Navy; [7]National Institutes of Health; [8]U.S. Army Medical Research Institute of Infectious Diseases; [9]U.S. Agency for International Development; [10]CDC

In the fifth paragraph, the third sentence should read as follows: "**After aggressive response** in Lofa, the county experienced multiple outbreak waves, with a peak in case counts between late July and late September (Figure 1)."

In the sixth paragraph, the fourth sentence should read as follows: "As of November 8, MoHSW reported 329 health care workers infected with Ebola**, including 157 who died**."

In the seventh paragraph, the third sentence should read as follows: "The Firestone company established a **10-bed unit** in April in Margibi county (*4*)."

In the Discussion, the fifth sentence should read, "However, progress of control efforts is tenuous **as situation reports in the past 2 weeks suggest a leveling off of case counts and outbreaks in new areas."**

Vol. 63, No. 45

In this issue, the date in the title of an announcement was incorrect. The title should read, "World Day of Remembrance for Road Traffic Victims — November 16, **2014**."

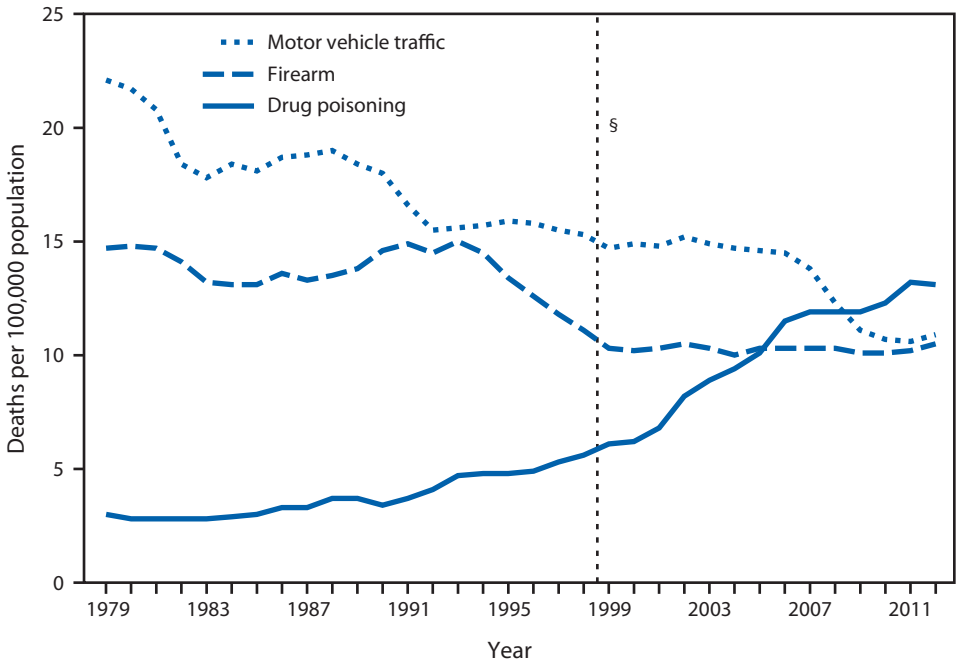
Vol. 63, No. 44

In the report, "Declines in Pneumonia Hospitalizations of Children Aged <2 Years Associated with the Use of Pneumococcal Conjugate Vaccines — Tennessee, 1998–2012," in Table 2, under the heading and subheading PCV13 years compared with pre-PCV7 years†, % change in rates, the value should read, **-72**.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Death Rates* for Three Selected Causes of Injury†—National Vital Statistics System, United States, 1979–2012



* Per 100,000, age-adjusted to the 2000 U.S. standard population.
† Selected because they are the most frequently occurring causes of injury deaths. Injuries are from all manners, including unintentional, suicide, homicide, undetermined intent, and legal intervention. Drug poisoning deaths include those resulting from drug overdose and other misuse of drugs. Drugs include legal and illegal drugs.
§ In 1999, *International Classification of Diseases, 10th Revision* (ICD-10) replaced the previous revision of the ICD (ICD-9). This resulted in approximately 5% fewer deaths being classified as motor vehicle traffic–related deaths and 2% more deaths being classified as poisoning-related deaths. Therefore, death rates for 1998 and earlier are not directly comparable with those computed after 1998. Little change was observed in the classification of firearm-related deaths from ICD-9 to ICD-10.

In 2012, a total of 41,502 drug poisoning deaths, 34,935 motor vehicle traffic deaths, and 33,563 firearm deaths occurred. The age-adjusted death rate for drug poisoning more than quadrupled from 3.0 per 100,000 in 1979 to 13.1 in 2012. In contrast, the age-adjusted rate dropped from 22.1 to 10.9 for motor vehicle traffic deaths and from 14.7 to 10.5 for firearm deaths during this period. The age-adjusted drug poisoning death rate exceeded the motor vehicle traffic death rate beginning in 2009.

Source: CDC WONDER, compressed mortality file, underlying cause-of-death, available at http://wonder.cdc.gov/mortsql.html.

Reported by: Li-Hui Chen, PhD, lchen3@cdc.gov, 301-458-4446; Andrew Fenelon.

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ISSN: 0149-2195