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Healthy and Safe Swimming Week — May 18–24, 2015

May 18–24, 2015, marks the 11th annual Healthy and Safe Swimming Week (formerly known as Recreational Water Illness and Injury Prevention Week). This observance highlights ways in which swimmers, parents, pool owners and operators, beach managers, and public health can maximize the health benefits of water-based physical activity, while minimizing the risk for recreational water–associated illness and injury. More information is available at http://www.cdc.gov/healthywater/observances/hss-week/index.html.

This year's theme, "Make a Healthy Splash: Share the Fun, Not the Germs," focuses on a few easy and effective steps swimmers and parents can take to protect themselves and their families and friends from infectious pathogens in pools, waterparks, hot tubs, spas, and water playgrounds. These steps are highlighted in CDC's new Healthy Swimming brochure, available with other free promotional materials at http://www.cdc.gov/healthywater/swimming/resources/index.html.

CDC also released the 1st Edition of the Model Aquatic Health Code in August 2014 (*1*), a voluntary guidance document that can help state and local authorities and the aquatics sector make swimming and other water activities healthier and safer. The first Conference for the Model Aquatic Health Code (CMAHC) will be held October 6–7, 2015, in Scottsdale, Arizona, where CMAHC members* can vote on potential MAHC changes. A public health communications toolkit for Healthy and Safe Swimming Week is available at http://www.cdc.gov/healthywater/observances/hss-week/response-tools-public-health.html.

* More information on how to become a CMAHC member is available at http://www.cmahc.org/membership.php.

Reference

1. CDC. The Model Aquatic Health Code (MAHC): a model public swimming pool and spa code. Washington, DC: US Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/healthywater/swimming/pools/mahc/.

Norovirus Outbreak Associated with a Natural Lake Used for Recreation — Oregon, 2014

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In July 2014, Multnomah County public health officials investigated a norovirus outbreak among persons visiting Blue Lake Regional Park in Oregon. During the weekend of the reported illnesses (Friday, July 11–Sunday, July 13) approximately 15,400 persons visited the park. The investigation identified 65 probable and five laboratory-confirmed cases of norovirus infection (70 total cases). No hospitalizations or deaths were reported. Analyses from a retrospective cohort study revealed that swimming at Blue Lake during July 12–13 was significantly associated with illness during July 13–14 (adjusted

INSIDE

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

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relative risk = 2.3; 95% confidence interval [CI] = 1.1–64.9). Persons who swam were more than twice as likely to become ill compared with those who did not swim in the lake. To control the outbreak, Blue Lake was closed for 10 days to prevent further illness. This investigation underscores the need for guidance for determining when to reopen untreated recreational water venues (e.g., lakes) associated with outbreaks, and communication tools to inform the public about the risks associated with swimming in untreated recreational water venues and measures that can prevent illness.

On July 14, Multnomah County Health Department (MCHD) was notified of 13 cases of acute gastrointestinal illness among members of three separate groups who had visited Blue Lake Regional Park over the previous weekend, July 11–13. MCHD began to investigate the potential outbreak to identify risk factors for illness, and develop and implement control measures to prevent additional illness.

The park, located just outside of Portland (Multnomah County), is a popular destination for city residents during the summer. The park has a lake for swimming, picnic grounds, paddleboats, and a splash pad (a chlorinated spray ground with features that shower and pour water). During the weekend of the reported illnesses, approximately 1,700 persons visited the park on Friday, July 11; 7,700 on Saturday, July 12; and 6,000 on Sunday, July 13, thousands more visitors compared with an average summer weekend.

Epidemiologic Investigation

To control the outbreak, Blue Lake was closed for 10 days to prevent other illness. Telephone interviews of both ill and non-ill persons were conducted as part of a retrospective cohort study using contact information for persons on the reservations list for the park picnic grounds during the weekend of interest, July 11–July 13. Persons who had made the reservations were contacted by MCHD and asked to provide contact information for up to eight persons in their group; 139 persons were identified. State and Portland metro-area local health departments (Clackamas, Clark, Multnomah, and Washington counties) interviewed 109 (78%) of the 139 persons. A probable case was defined as any vomiting or diarrhea with onsets 7–45 hours after visiting the park, in a person who visited the park on July 11, 12, or 13. A confirmed case was defined as meeting the probable case definition and having laboratory-confirmed norovirus infection. Because this was a high profile outbreak and was heavily covered in the media, MCHD received 52 additional reports of illness from persons who contacted MCHD and other local health departments with symptoms consistent with norovirus infection but they were not included in the retrospective cohort study because they were not identified through the reservation list. The investigation identified 65 probable and five laboratory-confirmed cases of norovirus infection (70 total cases).

In the cohort study, approximately 17% (18 of 109) of participants met the case definition; 10 (56%) reported having

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any diarrhea and 14 (78%) reported vomiting. The median incubation period was 31 hours (range = 7–45 hours), and the median duration of illness was 10 hours (range = 4–24 hours). However, at the time of their interview, three persons reported that their symptoms had not yet resolved. No hospitalizations or deaths were reported.

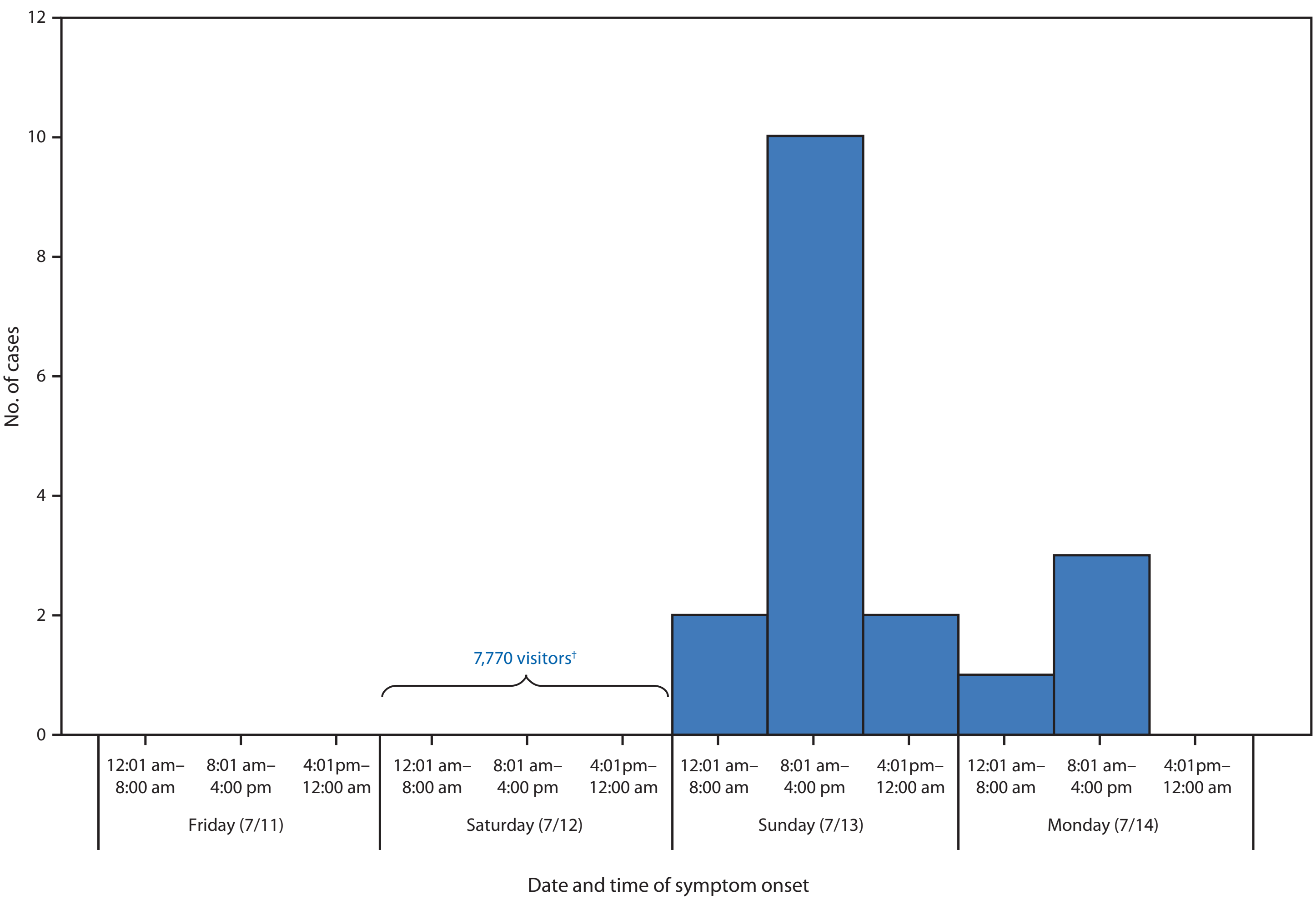
The percentage of visitors who were at the lake on Saturday, July 12 and became ill was 25% (17 of 68 persons) (Figure). Only one person who visited the lake on Sunday became ill, and no Friday visitors became ill. Those who became ill were significantly younger than those who were not ill (Table 1). Swimming (including immersion under water or wading in the lake), using the splash pad, boating, and younger age (aged 4–10 years) were each significantly associated with becoming ill in bivariate analyses (Table 2). However, when all of these risk factors were assessed simultaneously in one logistic regression model to calculate adjusted relative risk estimates, only swimming remained significantly associated with illness. Persons who swam were 2.3 times (95% CI = 1.1–4.9) more likely to become ill compared with those who did not swim in the lake (Table 2). The attributable risk for swimming in the lake was 91.3% (95% CI = 87.9%–93.2%).

TABLE 1. Demographic characteristics of cases and non-cases,* outbreak of norovirus at Blue Lake Recreational Area — Oregon, 2014

	Age† (yrs)		Gender§ (%)	
Chacteristic	**Median**	**Range**	**Female**	**Male**
Cases	10	4–27	72.2	27.8
Non-cases	31	1–68	62.9	37.1

* N = 109 persons interviewed; cases are defined as persons reporting onset of illness (vomiting or diarrhea) and non-cases are defined as those persons not reporting illness.
† p-value = 0.0002.
§ p-value = 0.45.

FIGURE. Cases of norovirus infection* associated with recreational activities at Blue Lake Regional Park, Multnomah County, by date and time of onset of symptoms — Oregon, July 11–14, 2014



* N = 18.
† On Saturday, July 7, there were thousands more visitors compared to an average summer Saturday.

TABLE 2. Relative risk and rates of illness from norovirus, by exposure, in persons* during outbreak of norovirus at Blue Lake Recreational Area — Oregon, 2014

	Exposed to risk factor				Not exposed to risk factor				Relative risk model			Adjusted relative risk model			% ill persons exposed to risk factor
	Ill		Not ill		Ill		Not ill								
Characteristic	No.	(%)	No.	(%)	No.	(%)	No.	(%)	Risk	(95% CI)	p-value	Risk	(95% CI)	p-value	
Swam	13	(54.2)	11	(45.8)	5	(5.9)	80	(94.1)	9.2	(3.6–23.4)	<0.001	2.3	(1.1–4.9)†	0.02	72.2
Used the splash pad	11	(31.4)	24	(68.6)	7	(9.5)	67	(90.5)	3.3	(1.4–7.8)	0.0039	1.4	(0.6–3.0)§	0.51	61.1
Boated	10	(71.4)	4	(28.6)	8	(8.4)	87	(91.6)	8.5	(4.0–17.8)	<0.001	1.8	(0.7–4.7)¶	0.22	55.6
Aged 4–10 years versus 11+ years	14	(28)	36	(72)	4	(6.8)	55	(93.2)	1.3	(1.1–1.6)	0.0039	1.5	(0.7–3.3)**	0.3	77.8
Drank from drinking fountain	16	(17.2)	77	(82.8)	2	(12.5)	14 5	(87.5)	1.4	(0.3– 5.4)	0.27	NA	NA	NA	88.9
Ate any food	16	(16.2)	83	(83.8)	2	(25)	6	(75)	0.6	(0.2– 2.3)	0.52	NA	NA	NA	88.9
Used the restroom	13	(16.7)	65	(83.3)	2	(8.3)	22	(91.7)	2.0	(0.5–8.2)	0.17	NA	NA	NA	86.7
Played on play structure	5	(20.8)	19	(79.2)	13	(15.3)	72	(84.7)	1.4	(0.5–3.4)	0.52	NA	NA	NA	27.8

Abbreviation: NA = not applicable; 95% CI = 95% confidence interval.
* N = 109; however, counts used to calculate measures might not add up to 109 because of missing data.
† Controlled for boating, splash pad, and age.
§ Controlled for swimming, boating, and age.
¶ Controlled for swimming, splash pad, and age.
** Controlled for swimming, splash pad, and boating.

The mechanism by which the lake became contaminated is unknown; however, a swimmer's vomit or fecal incident in the lake over the weekend, probably on Saturday, July 12, could explain the point source outbreak pattern (Figure).

Laboratory Testing

Five ill persons provided stool specimens, which all tested positive for norovirus genogroup I by polymerase chain reaction. These specimens also tested negative for *Salmonella*, *Shigella*, *Escherichia coli* O157:H7, and *Campylobacter*.

Environmental Health Investigation

Blue Lake, just south of the Columbia River, is a natural lake, about 25 feet (7.6 m) at its deepest, but about half of the lake, including the swimming area, is 10 feet (3.0 m) deep or less. The beach area itself is a small area, approximately 300 feet long by 30 feet wide (91.4 m by 9.1 m). The water along the beach is shallow. Bubblers were installed in the swimming area to circulate water from the center of the lake into the swimming area. Before the outbreak, the bubblers were in operation and were working as designed. The lake is monitored for fecal contamination twice-weekly during May–September. MCHS was notified of a high *E. coli* result from the shallow swimming area at Blue Lake on July 16. The *E. coli* count was 304, above the safety threshold of 235. A follow-up sample, collected on July 17, did not violate Oregon water quality standards. Samples collected from July 14 were also below the threshold and considered safe, as were samples leading up to the outbreak. The laboratory does not conduct species identification tests. The positive test is a general indicator of fecal contamination, of which an animal or human could be the source. Because the timing of the fecal coliform elevation occurred after the outbreak, this spike in fecal contamination was determined to be unrelated to the norovirus outbreak. Blue Lake Regional Park is on a sewage system versus a septic tank system. Multnomah County Environmental Health conducted an evaluation of the park after notification of illness and did not find any signs of failure of the sewage system. Blue Lake uses well water for watering the large land area, but uses a public water source for drinking water and for their facilities.

Blue Lake proactively closed the beach to swimming, paddleboat, and fishing activities from Monday, July 14 until Wednesday, July 23; however, the picnic grounds and splash pad remained open during this period. On July 23, MCHD and the Oregon Public Health Division sampled lake water by pumping approximately 90 L from different areas of the swimming area through each of two hollow-fiber ultrafilters (*1*). Two samples (100 mL each) were also collected for *E. coli* testing. Ultrafilter samples were sent to CDC, which reported on July 30 that the samples had negative results for norovirus using real-time reverse transcription-PCR testing (*2*). *E. coli* concentrations in the tested samples were below state and federal ambient water quality standards.

Discussion

On the basis of symptom profiles, illness incubation and duration periods, and positive stool specimens, norovirus (a human pathogen) was the likely etiology of this outbreak. On the basis of the statistically significant epidemiologic link to swimming in Blue Lake, the lake was likely the outbreak

What is already known on this topic?

Nationally and internationally, norovirus outbreaks have been associated with untreated recreational water venues, such as lakes. During 2009–2010, the most recent years for which finalized data are available, there were 81 recreational water–associated disease outbreaks, 24 of them associated with untreated recreational water.

What is added by this report?

In July 2014, a norovirus outbreak associated with Blue Lake Regional Park in Oregon affected 70 persons. Swimming in the lake was significantly associated with illness; thus, the lake was closed for 11 days to swimming, paddleboat, and fishing activities.

What are the implications for public health practice?

Public health officials could greatly benefit from guidance for determining when to reopen untreated recreational water venues associated with outbreaks and public-facing health communication resources that promote healthy swimming and prevent recreational water–associated illness.

source.* Although, the mechanism by which the lake became contaminated is unknown, the most likely cause, based on the point source outbreak pattern, was a swimmer's vomit or fecal incident in the lake over the weekend, probably on Saturday, July 12. If a swimmer had a vomit or fecal incident in the lake on Saturday, July 12, the illness counts, by day of visit to the lake, suggest that the bubblers might have helped limit transmission to primarily Saturday, July 12 via dilution.†

During the previous 15 years, Blue Lake has been the source of other acute gastrointestinal illness outbreaks during the summer months. In 1991, Blue Lake was linked to a dual-pathogen outbreak (21 cases of *E. coli* O157:H7 and 59 cases of *Shigella* infection). In 2004, norovirus caused an outbreak associated with swimming in Blue Lake; this outbreak affected >100 persons (*3*,*4*). In addition, in the summer months Blue Lake often closes because of the presence of blue-green algae that can produce toxins harmful to humans and animals.

Because of the small beach area and the sheer numbers of park visitors, the bather load was high the weekend of the outbreak exposure. The effects of high bather load were likely exacerbated by the high temperatures (upwards of 90°F or 32°C), the potentially poor water circulation within the beach area, and the fact that shallow beach areas attract young children, among whom norovirus is the leading cause of medically attended acute gastroenteritis in the United States (*5*,*6*). Children also can be at higher risk for exposure because they are more likely to ingest water while swimming (*7*). In addition, there is no method to chemically treat the lake, allowing contamination and the potential of transmission to persist.

Because there are no evidence-based remediation steps for untreated recreational water venues as there are for treated recreational water venues (e.g., pools), public health officials found it challenging to come to a clear consensus on when to reopen the lake. There is evidence that noroviruses can survive in water for several months and possibly years (*8*). Consequently, MCHD relied on commonsense strategies (e.g., waiting multiple incubation periods to ensure illness had subsided) and the expertise of health officers to decide when to reopen the lake. Public health agencies could benefit from the development of evidence-based criteria to determine when to reopen untreated recreational water venues associated with outbreaks (e.g., venue-specific water quality regression models).

Preventing and controlling such outbreaks also calls for engaging the swimming public, who represent a key source of recreational water contamination. Blue Lake has policies in place to prevent high-risk situations, including biweekly water testing for fecal contamination, installing bubblers to increase water circulation, and banning children aged <5 years§ from the beach area to limit vomiting and fecal incidents in the water, policies which existed before the outbreak. However, these strategies alone cannot eliminate the risk of contamination of recreational water, and more proactive (i.e., pre-outbreak) dissemination of messages that promote healthy swimming are needed. Because of the disproportionate reporting of outbreaks associated with treated recreational water venues, CDC has historically focused on developing healthy swimming promotion resources for treated venues.¶ However, as this outbreak highlights, healthy swimming promotion resources for untreated recreational water venues are also needed. Such resources would need to balance raising awareness of the health benefits of aquatic-based physical activity and outdoor recreation with informing the swimming public of steps that it can take to minimize potential risks of swimming in untreated recreational water (*9*). To optimize the effectiveness of healthy swimming messages specific to untreated recreational water venues, public health experts need to better understand how the swimming public perceives these venues and their associated risk of infection, particularly given the communal nature of swimming. Thus, understanding the public's knowledge, attitudes, and practices surrounding untreated recreational water could be the first step to preventing illness.

* The water, and thus the tested samples, might have no longer been contaminated by norovirus 11 days after Saturday, July 12, or the contamination levels in the samples might have fallen below the level of detection.

† Based on the hypothesis that a swimmer had a vomit or fecal incident in the lake on Saturday, July 12, and 17 of 18 illnesses occurred in persons who visited the lake Saturday, but only one illness occurred in a person who visited the lake on Sunday.

§ CDC does not recommend banning children aged <5 years from recreational water venues as a strategy to prevent recreational water–associated illness outbreaks.

¶ More information is available at http://www.cdc.gov/healthywater/swimming/resources/index.html.

Acknowledgments

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Decrease in Rate of Opioid Analgesic Overdose Deaths — Staten Island, New York City, 2011–2013

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From 2000 to 2011, the rate of unintentional drug poisoning (overdose) deaths involving opioid analgesics increased 435% in Staten Island, from 2.0 to 10.7 per 100,000 residents. During 2005–2011, disparities widened between Staten Island and the other four New York City (NYC) boroughs (Bronx, Brooklyn, Manhattan, and Queens) (*1*); in 2011, the rate in Staten Island was 3.0–4.5 times higher than in the other boroughs. In response, the NYC Department of Health and Mental Hygiene (DOHMH) implemented a comprehensive five-part public health strategy, with both citywide and Staten Island–targeted efforts: 1) citywide opioid prescribing guidelines, 2) a data brief for local media highlighting Staten Island mortality and prescribing data, 3) Staten Island town hall meetings convened by the NYC commissioner of health and meetings with Staten Island stakeholders, 4) a Staten Island campaign to promote prescribing guidelines, and 5) citywide airing of public service announcements with additional airing in Staten Island. Concurrently, the New York state legislature enacted the Internet System for Tracking Over-Prescribing (I-STOP), a law requiring prescribers to review the state prescription monitoring system before prescribing controlled substances. This report describes a 29% decline in the opioid analgesic–involved overdose death rate in Staten Island from 2011 to 2013, while the rate did not change in the other four NYC boroughs, and compares opioid analgesic prescribing data for Staten Island with data for the other boroughs. Targeted public health interventions might be effective in lowering opioid analgesic–involved overdose mortality rates.

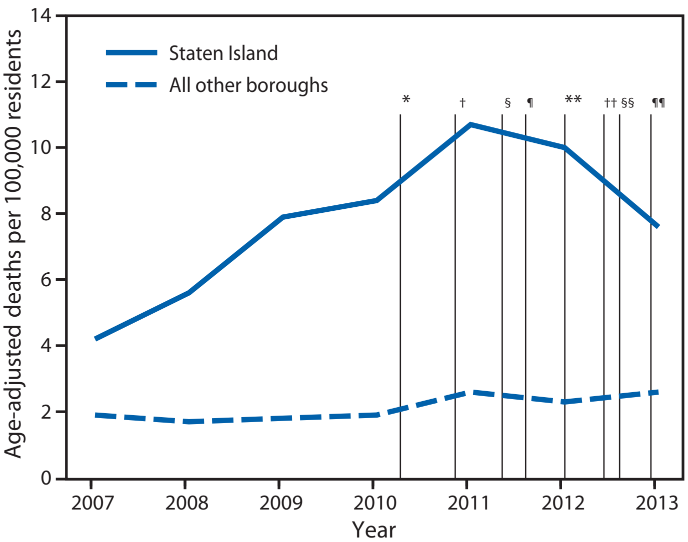
In NYC, the rate of opioid analgesic–involved overdose deaths increased 57% from 2005 to 2011, from 2.1 to 3.3 per 100,000 residents. While rates increased citywide, the rate in Staten Island increased 257% during the same period, from 3.0 to 10.7 per 100,000 residents (Figure). In April 2011, DOHMH reported citywide opioid analgesic–involved overdose mortality, highlighting the disproportionately high rates in Staten Island (*2*). This report received substantial media coverage, particularly among Staten Island local news outlets. In November 2011, DOHMH published opioid prescribing guidelines for general medical providers with the following key messages: 1) a 3-day supply of short-acting opioid analgesic is usually sufficient for acute pain, 2) avoid prescribing opioid analgesics for chronic noncancer pain, 3) avoid high-dose opioid analgesic prescriptions, and 4) avoid prescribing opioid analgesics to patients taking benzodiazepines (*3*). In January 2013, DOHMH released opioid prescribing guidelines for emergency departments (*4*) that were adopted citywide by 39 emergency departments, including both of Staten Island's hospitals.

Throughout 2013, DOHMH met in Staten Island with local hospital, addiction treatment, and syringe exchange programs, as well as local politicians to share overdose mortality trends and guidelines. In June 2013, the commissioner of health held two conferences for Staten Island physicians on judicious opioid prescribing. These guidelines were promoted to Staten Island prescribers via one-to-one office educational visits in which DOHMH recommendations, resources, and tools were disseminated. During 2012–2014, DOHMH aired two television advertisements highlighting the risks of opioid analgesics citywide, with additional airtime in Staten Island. These interventions occurred in close temporal proximity to the enactment and media coverage of I-STOP, state legislation implemented in August 2013 that requires providers to consult the state Prescription Monitoring Program, a registry of controlled-substance prescriptions filled by New Yorkers, before prescribing or dispensing Schedule II, III, or IV controlled substances.

To evaluate the impact of the public health interventions, DOHMH assessed changes in unintentional opioid analgesic–involved overdose mortality rates and changes in opioid analgesic prescribing patterns. Mortality data were derived from two linked sources, NYC death certificates and toxicology findings from the Office of the Chief Medical Examiner. Deaths were defined as unintentional drug poisoning (overdose) if the medical examiner determined manner of death as accidental and the underlying or multiple cause code was assigned an ICD-10 code of X40–X44, F11–F16, or F18–F19 (excluding F-codes with 0.2 or 0.6 third digit). Toxicology metabolites were abstracted from medical examiner files and linked to death certificate data.

Toxicology findings were used to describe the drugs involved in overdose deaths. Methadone-involved overdose deaths were reported separately, because there are approximately 30,000 New Yorkers maintained on methadone for opioid use disorders. Staten Island opioid analgesic–involved overdose rates were compared with the other four NYC boroughs combined. Overall, overdose rates also were assessed to determine whether changes in opioid analgesic–involved overdose rates were offset by changes in other drug poisonings, principally heroin.

FIGURE. Age-adjusted rate of unintentional drug poisoning (overdose) deaths involving opioid analgesics, by borough of residence, and New York City public health interventions — 2007–2013



Source: New York City Office of the Chief Medical Examiner and New York City Department of Health and Mental Hygiene 2007–2013.

* April 2011: Distributed a data brief citywide that highlighted overdose mortality and prescription use in Staten Island.

† November 2011: Distributed opioid prescribing guidelines to all providers citywide.

§ May 2012: Ran first public service announcement campaign citywide.

¶ August 2012: State legislation passed mandating use of the prescription monitoring program.

** January 2013: Distributed opioid prescribing guidelines to emergency departments citywide.

†† June 2013: Town halls convened in Staten Island by New York City commissioner of health and meeting held with Staten Island stakeholders. Implemented detailing campaign to promote opioid prescribing guidelines to prescribers in Staten Island.

§§ August 2013: Statewide mandatory prescriber use of prescription monitoring program begun.

¶¶ December 2013: Ran second public service announcement campaign citywide with additional targeted airing in Staten Island.

Data for opioid analgesic prescriptions filled by NYC residents were derived from the New York State Prescription Monitoring Program. DOHMH assessed median day supply and the fill rates of prescriptions and high morphine equivalent–dose prescriptions (>100 morphine milligram equivalents) (*5*) by borough of patient residence.

Age-adjusted rates were calculated using NYC population estimates for the period 2000–2013 and the U.S. Census 2000 standard population. To evaluate the impact of the public health interventions, prescription rates were compared annually and for the fourth quarters (October–December) during 2011–2013. Given that both office educational visits with Staten Island prescribers and implementation of I-STOP occurred in the third quarter of 2013, the fourth quarter of 2013 was compared with the fourth quarters of 2011 and 2012. Rate changes were tested using z-tests and 95% confidence intervals; comparisons were based on gamma confidence intervals distribution (*6*).

From 2000 to 2011, Staten Island residents had the highest rate of opioid analgesic–involved overdose mortality in NYC. From 2005 to 2011, the rate increased 257% in Staten Island, compared with a 44% increase in the other four boroughs combined. After implementation of the public health initiatives, opioid analgesic mortality rates decreased 29% from 2011 to 2013, from 10.7 to 7.6 per 100,000 Staten Island residents (Table 1). In comparison, the rate for the other four boroughs combined did not change from 2011 to 2013 (2.6 per 100,000 residents, for both years). Among Staten Island residents, the rate of heroin-involved overdose deaths fluctuated but had a net increase of 39% from 2011 to 2013, from 6.2 in 2011 to 8.6 per 100,000 residents in 2013. Among the other four boroughs combined, heroin-involved overdose deaths increased 35% during the same period (from 3.7 in 2011 to 5.0 per 100,000 residents in 2013). In Staten Island, overall drug-involved overdose deaths decreased 4% from 2011 to 2013, from a rate of 18.4 to 17.6 per 100,000 residents. During that period, the rate for the other four boroughs increased 20%, from 7.9 to 9.5 per 100,000.

The median day supply for filled opioid analgesic prescriptions for Staten Island residents was unchanged during 2011–2013 (30 days). In contrast, the median day supply for the other four boroughs was lower, but increased from 2011 to 2013, from 15 to 20 days (Table 2).

In 2011, Staten Island residents filled opioid analgesic prescriptions at a higher rate (502.0 per 1,000 residents) than did residents of the other four boroughs (236.7) and filled high-dose prescriptions at rates three times higher (132.4) than residents of the other boroughs (40.7) (Table 2). In 2012, the rate of opioid analgesic prescriptions filled decreased in all boroughs, whereas rates of high-dose prescriptions increased slightly. Compared with 2011, in 2013 the opioid analgesic prescriptions fill rate continued to decrease for residents of all boroughs, by 9.8% in Staten Island (to 452.9 per 1,000 residents) and by 8.2% (to 217.2) elsewhere. The rate of high dose prescriptions decreased 8.2% (to 121.6 per 1,000 residents) in Staten Island while increasing 4.7% (to 42.6) in the other four boroughs. The decrease in Staten Island rates of high dose prescriptions continued in the final quarter of 2013.

Discussion

After implementation of targeted and general public health initiatives, Staten Island saw 2 years of decreases in opioid analgesic high-dose prescribing and opioid analgesic–involved overdose mortality; the decreases followed 11 years of increases. In contrast, high-dose prescribing in the other four NYC boroughs increased without changes in opioid analgesic–involved overdose mortality rates. In addition, the decreases in opioid analgesic overdoses on Staten Island were not offset by increases in heroin-involved overdose mortality.

TABLE 1. Number and rate per 100,000 residents* of unintentional drug poisoning (overdose) deaths involving any drug, heroin, or opioid analgesics,† by borough of residence§ — New York City, 2011–2013

	2011		2012		2013		
Borough of residence	**Total**	**(Rate)**	**Total**	**(Rate)**	**Total**	**(Rate)**	**% rate change from 2011 to 2013**
New York City							
Any drug	**567**	(8.5)	**660**	(9.8)	**672**	(9.9)	+16.4¶
Heroin	**253**	(3.8)	**339**	(5.0)	**352**	(5.2)	+36.8¶
Opioid analgesics	**201**	(3.0)	**181**	(2.7)	**197**	(2.9)	-3.3
Staten Island							
Any drug	**69**	(18.4)	**74**	(19.9)	**64**	(17.6)	-4.3¶
Heroin	**22**	(6.2)	**36**	(10.1)	**32**	(8.6)	+38.7¶
Opioid analgesics	**40**	(10.7)	**37**	(10.0)	**28**	(7.6)	-29.0¶
Other four boroughs							
Any drugs	**498**	(7.9)	**586**	(9.3)	**608**	(9.5)	+20.3¶
Heroin	**231**	(3.7)	**303**	(4.8)	**320**	(5.0)	+35.1¶
Opioid analgesics	**161**	(2.6)	**144**	(2.3)	**169**	(2.6)	0.0

Source: Office of Chief Medical Examiner, New York City.

* Age-adjusted rates are calculated using intercensal estimates updated in December 2014, and are weighted to U.S. Census Standard 2000.

† The drug types are not mutually exclusive; most overdoses involved more than one substance.

§ Analysis limited to residents of Staten Island and the other four New York City boroughs (Bronx, Brooklyn, Manhattan, and Queens), based on data reported on death certificates.

¶ Statistically significant rate change (p<0.05), determined by z-tests and 95% confidence interval comparisons based on gamma confidence intervals distribution.

Decreases in opioid analgesic–involved overdose mortality have been reported from Wilkes County, North Carolina (*7*), Utah (*8*), Washington (*9*), and Florida (*10*). Each county or state employed a tailored strategy or combination of strategies to address opioid analgesic–involved overdose deaths, most of which included policy and clinical interventions. NYC employed both a general and geographically targeted approach, similar to Wilkes County, aiming to reach the entire NYC population and all prescribers, but found decreased mortality only in the targeted Staten Island area that received the most intensive interventions.

The findings in this report are subject to at least three limitations. First, although decreases were observed in both high-dose prescribing and opioid analgesic–involved mortality rates, it is not known whether decedents had taken prescribed or nonprescribed opioids, nor at what doses. Both decreases might be attributed to decreased risk for persons prescribed opioids or a decrease in the amount of opioids available for diversion to nonprescribed use. Second, law enforcement efforts to decrease the supply of diverted opioids or to reduce malpractice were not considered, although these efforts occurred during the period of the public health interventions. Finally, although the public health interventions were followed by a reduction in opioid analgesic–involved overdose mortality rates in Staten Island, it is not possible to determine the extent of each intervention's contribution to the decline.

Despite limitations, the fact that some of the initiatives were statewide or citywide (I-STOP, prescribing guidelines, and public service announcements), whereas others were Staten Island–specific (local media, local community engagement and conferences, tailored advertising messages, and office educational visits with prescribers) suggests that the community-specific initiatives might have been key to the decreases in Staten Island without corresponding decreases citywide. Staten Island's size (500,000 pop.) and relative geographic separation from the other four NYC boroughs also might have enhanced its saturation with prevention messages and strategies. This tailored and intensive approach might be effective in other jurisdictions with high rates of opioid analgesic–involved mortality.

What is known already?

Opioid analgesic–involved overdose mortality is a serious public health issue. In New York City, the rate of opioid analgesic–involved overdose deaths increased 57% citywide, from 2005 to 2011. However, in one borough, Staten Island, the rate increased 257% during that period.

What is added by this report?

This report shows that data-driven, multi-pronged public health strategies, including judicious prescribing guidelines, office educational visits with providers, dissemination of timely data reports, and media campaigns, might contribute to a reduction in the rate of opioid analgesic–involved overdose deaths in Staten Island.

What are the implications for public health practice?

Targeted public health interventions appear effective in lowering opioid analgesic–involved overdose mortality rates; the interventions in Staten Island might be replicated by other health departments.

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TABLE 2. Number and rate per 1,000 residents* of annual and quarterly (October–December) opioid analgesic prescriptions and high morphine equivalent dose prescriptions received,† by borough of residence§ — New York City, 2011–2013

Borough of residence	2011 Total	2011 (Rate)	2012 Total	2012 (Rate)	2013 Total	2013 (Rate)	% rate change from 2011 to 2013¶
New York City							
Opioid analgesic prescriptions	**2,172,238**	(251.9)	**2,167,719**	(248.4)	**2,029,541**	(230.6)	-8.5%
High morphine equivalent dose prescriptions	**395,605**	(45.8)	**419,476**	(48.1)	**413,801**	(47.0)	+2.6%
Staten Island							
Opioid analgesic prescriptions	**251,705**	(502.0)	**245,449**	(487.3)	**231,139**	(452.9)	-9.8%
High morphine equivalent dose prescriptions	**65,310**	(132.4)	**66,007**	(133.7)	**60,866**	(121.6)	-8.2%
Other four boroughs							
Opioid analgesic prescriptions	**1,920,544**	(236.7)	**1,922,270**	(234.1)	**1,798,402**	(217.2)	-8.2%
High morphine equivalent dose prescriptions	**330,276**	(40.7)	**353,469**	(43.1)	**352,935**	(42.6)	+4.7%
Median days supply of drug							
New York City	**16**	—	**20**	—	**20**	—	—
Staten Island	**30**	—	**30**	—	**30**	—	—
Other four boroughs	**15**	—	**17**	—	**20**	—	—

Borough of residence	October–December 2011 Total	October–December 2011 (Rate)	October–December 2012 Total	October–December 2012 (Rate)	October–December 2013 Total	October–December 2013 (Rate)	% rate change from October–December 2011 to October–December 2013¶
New York City							
Opioid analgesic prescriptions	**553,650**	(64.2)	**531,109**	(60.9)	**496,100**	(56.3)	-12.3%
High morphine equivalent dose prescriptions	**107,013**	(12.4)	**105,477**	(12.1)	**104,886**	(11.9)	-4.0%
Staten Island							
Opioid analgesic prescriptions	**63,676**	(127.0)	**58,234**	(115.3)	**56,769**	(110.7)	-12.8%
High morphine equivalent dose prescriptions	**17,098**	(34.7)	**15,611**	(31.5)	**15,011**	(29.9)	-13.8%
Other four boroughs							
Opioid analgesic prescriptions	**489,974**	(60.4)	**472,875**	(57.6)	**439,331**	(53.0)	-12.3%
High morphine equivalent dose prescriptions	**89,915**	(11.1)	**89,866**	(11.0)	**89,875**	(10.9)	-1.8%

Source: Bureau of Narcotic Enforcement, Prescription Drug Monitoring Program, New York State Department of Health, 2011–2013.

* Age-adjusted rates are calculated using intercensal estimates updated in December 2014, and are weighted to U.S. Census Standard 2000.

† Analysis includes prescriptions written for Schedule II (excluding codeine-2) and hydrocodone. Prescriptions written by veterinarians, or written under institutional licenses, or prescriptions with missing prescriber ID, or missing patient ID are excluded. Morphine equivalent dose (MED) is the equivalent of 1 mg of morphine; high MED prescriptions are greater than 100 MED.

§ Analysis limited to residents of Staten Island and the other four New York City boroughs (Bronx, Brooklyn, Manhattan, and Queens).

¶ All rate changes were statistically significant ($p<0.05$).

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Preliminary Incidence and Trends of Infection with Pathogens Transmitted Commonly Through Food — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 2006–2014

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Foodborne illnesses represent a substantial, yet largely preventable, health burden in the United States. In 10 U.S. geographic areas, the Foodborne Diseases Active Surveillance Network* (FoodNet) monitors the incidence of laboratory-confirmed infections caused by nine pathogens transmitted commonly through food. This report summarizes preliminary 2014 data and describes changes in incidence compared with 2006–2008 and 2011–2013. In 2014, FoodNet reported 19,542 infections, 4,445 hospitalizations, and 71 deaths. The incidence of Shiga toxin–producing *Escherichia coli* (STEC) O157 and *Salmonella enterica* serotype Typhimurium infections declined in 2014 compared with 2006–2008, and the incidence of infection with *Campylobacter, Vibrio*, and *Salmonella* serotypes Infantis and Javiana was higher. Compared with 2011–2013, the incidence of STEC O157 and *Salmonella* Typhimurium infections was lower, and the incidence of STEC non-O157 and *Salmonella* serotype Infantis infections was higher in 2014. Despite ongoing food safety efforts, the incidence of many infections remains high, indicating that further prevention measures are needed to make food safer and achieve national health objectives.

FoodNet conducts active, population-based surveillance for laboratory-confirmed infections caused by *Campylobacter*, *Cryptosporidium*, *Cyclospora*, *Listeria*, *Salmonella*, Shiga toxin–producing *Escherichia coli* (STEC) O157 and non-O157, *Shigella*, *Vibrio*, and *Yersinia* in 10 geographic areas covering approximately 15% of the U.S. population (an estimated 48 million persons in 2013). FoodNet is a collaboration among CDC, 10 state health departments, the U.S. Department of Agriculture's Food Safety and Inspection Service (USDA-FSIS), and the Food and Drug Administration (FDA). Hospitalizations occurring within 7 days of specimen collection are recorded, as is the patient's vital status at hospital discharge or 7 days after specimen collection if the patient was not hospitalized. Hospitalizations and deaths that occur within 7 days of specimen collection are attributed to the infection. Surveillance for physician-diagnosed postdiarrheal hemolytic uremic syndrome, a complication of STEC infection characterized by renal failure, thrombocytopenia, and microangiopathic hemolytic anemia, is conducted through a network of nephrologists and infection preventionists and by hospital discharge data review. This report includes hemolytic uremic syndrome data for persons aged <18 years for 2013, the most recent year for which data are available.

Incidence was calculated by dividing the number of laboratory-confirmed infections in 2014 by U.S. Census estimates of the surveillance area population for 2013.† Incidence of culture-confirmed bacterial infections and laboratory-confirmed parasitic infections (e.g., identified by enzyme immunoassay) are reported. A negative binomial model with 95% confidence intervals (CIs) was used to estimate changes in incidence from 2006–2008 to 2014 and from 2011–2013 to 2014. Change in the combined overall incidence of infection with six key foodborne pathogens§ was estimated. For STEC non-O157, because of changing diagnostic practices and testing methods, only change in incidence since 2011–2013 was assessed; for *Cyclospora*, change was not assessed because data were sparse. For hemolytic uremic syndrome, 2013 incidence was compared with that in 2006–2008. The number of reports of positive culture-independent diagnostic tests without corresponding culture confirmation is reported for *Campylobacter*, *Salmonella*, *Shigella*, STEC, and *Vibrio*. Incidence calculations do not include culture-independent diagnostic test reports.

Cases of Infection, Incidence, and Trends

In 2014, FoodNet identified 19,542 cases of infection, 4,445 hospitalizations, and 71 deaths (Table). The number and incidence per 100,000 population were as follows: *Salmonella* (7,452 [15.45]), *Campylobacter* (6,486 [13.45]), *Shigella* (2,801 [5.81]), *Cryptosporidium* (1,175 [2.44]), STEC non-O157 (690 [1.43]), STEC O157 (445 [0.92]), *Vibrio* (216 [0.45]), *Yersinia* (133 [0.28]), *Listeria* (118 [0.24]), and *Cyclospora* (26 [0.05]). The percentage of infections associated with outbreaks was as follows: STEC O157 (16%), *Listeria* (11%), STEC non-O157 (7%), *Shigella* (7%), *Salmonella* (6%),

* Additional information available at http://www.cdc.gov/foodnet.

† Final incidence rates will be reported when population estimates for 2014 are available.

§ The overall incidence of infection combines data for *Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Vibrio*, and *Yersinia*, six key bacterial pathogens for which >50% of illnesses are estimated to be transmitted by food.

TABLE. Number of cases of culture-confirmed bacterial and laboratory-confirmed parasitic infection, hospitalizations, and deaths, by pathogen — Foodborne Diseases Active Surveillance Network, United States, 2014*

	Cases			Hospitalizations		Deaths	
Pathogen	**No.**	**Incidence†**	**Objective§**	**No.**	**(%)**	**No.**	**(%)**
Bacteria							
Campylobacter	6,486	13.45	8.5	1,080	(17)	11	(0.2)
Listeria	118	0.24	0.2	108	(92)	18	(15.3)
Salmonella	7,452	15.45	11.4	2,141	(29)	30	(0.4)
Shigella	2,801	5.81	N/A¶	569	(20)	2	(0.1)
STEC O157	445	0.92	0.6	154	(35)	3	(0.7)
STEC non-O157	690	1.43	N/A	104	(15)	0	(0.0)
Vibrio	216	0.45	0.2	40	(19)	2	(0.9)
Yersinia	133	0.28	0.3	30	(23)	1	(0.8)
Parasites							
Cryptosporidium	1,175	2.44	N/A	217	(18)	4	(0.3)
Cyclospora	26	0.05	N/A	2	(8)	0	(0.0)
Total	**19,542**			**4,445**		**71**	

Abbreviations: N/A = not available; STEC = Shiga toxin–producing *Escherichia coli.*
* Data for 2014 are preliminary.
† Per 100,000 population.
§ *Healthy People 2020* objective targets for incidence of *Campylobacter*, *Listeria*, *Salmonella*, STEC O157, *Vibrio*, and *Yersinia* infections per 100,000 population.
¶ No national health objective exists for these pathogens.

Vibrio (6%), *Cryptosporidium* (5%), *Yersinia* (0.8%), and *Campylobacter* (0.6%).

Among 6,565 (88%) serotyped *Salmonella* isolates in 2014, the number and incidence per 100,000 population of the top six serotypes were as follows: Enteritidis (1,401 [2.90]), Typhimurium (806 [1.67]), Newport (724 [1.50]), Javiana (639 [1.32]), I 4,[5],12:i:- (381 [0.79]), and Infantis (235 [0.49]). Among 208 (96%) speciated *Vibrio* isolates, 131 (63%) were *V. parahaemolyticus*, 27 (13%) were *V. alginolyticus*, and 19 (9%) were *V. vulnificus*. Among 546 (79%) serogrouped STEC non-O157 isolates, the top serogroups were O26 (31%), O103 (24%), and O111 (19%).

Compared with 2006–2008, the 2014 incidence was significantly lower for STEC O157 (32% decrease; CI = 18%–43%) and *Yersinia* (22% decrease; CI = 1%–39%) infections, higher for *Vibrio* (52% increase; CI = 22%–89%) and *Campylobacter* (13% increase; CI = 5%–21%) infections, and not significantly changed for other pathogens (Figure 1). Among the six most commonly identified *Salmonella* serotypes, the incidence was significantly lower in 2014 for Typhimurium (27% decrease; CI = 18%–35%) compared with 2006–2008, but significantly higher for Infantis (162% increase; CI = 100%–244%) and Javiana (131% increase; CI = 83%–191%). Incidence for the three serotypes with significant changes in 2014 was calculated for the period 2006–2014 (Figure 2). Compared with 2011–2013, the 2014 incidence was significantly lower for STEC O157 and *Salmonella* serotype Typhimurium infections and higher for STEC non-O157 and *Salmonella* serotype Infantis infections. The overall incidence of infection with the six key foodborne pathogens was not significantly different from either of the comparison periods.

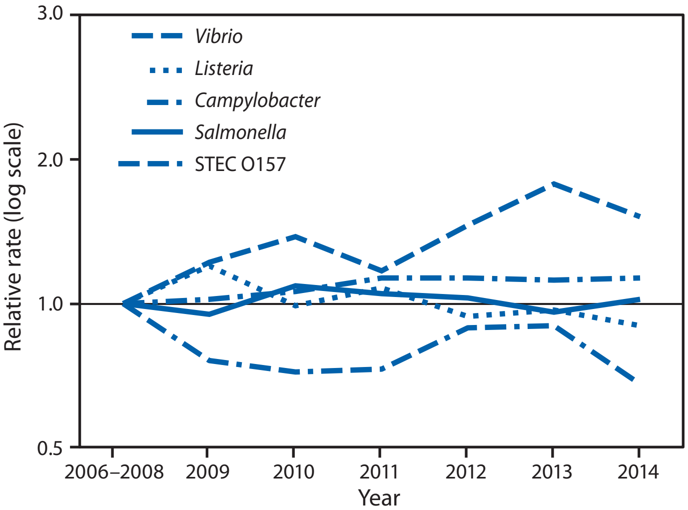
In 2013, a total of 87 cases of postdiarrheal hemolytic uremic syndrome were reported among children aged <18 years (0.79 cases per 100,000). Of these, 46 (53%) occurred in children aged <5 years (1.55 cases per 100,000). The incidence of hemolytic uremic syndrome was not significantly different than during 2006–2008 for either age group. No deaths were reported.

In addition to culture-confirmed infections (some with positive culture-independent diagnostic test results), there were 1,597 reports of positive culture-independent diagnostic tests that were not confirmed by culture, either because a culture did not yield the pathogen or because the specimen was not cultured. These reports were not included in the overall count of cases. Among 1,070 *Campylobacter* reports in this category, 553 (52%) had no culture, and 517 (48%) were culture-negative. Among 146 STEC reports, 62 (42%) had no culture, and 84 (58%) were culture-negative. The Shiga toxin–positive result was confirmed for 65 (48%) of 135 broths sent to a public health laboratory. The other reports of positive culture-independent diagnostic tests where culture was negative or not performed were of *Salmonella* (193), *Shigella* (186), and *Vibrio* (two).

Discussion

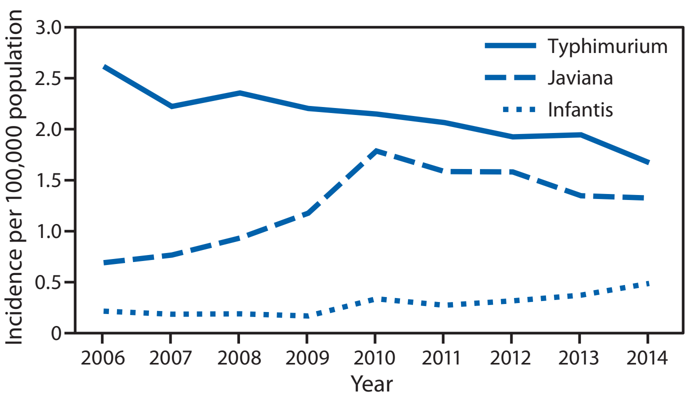
In 2014, the incidence of laboratory-confirmed Shiga toxin–producing *E. coli* O157 and *Salmonella* serotype Typhimurium infections was significantly lower than during 2006–2008, whereas the incidence of *Campylobacter*, *Vibrio*, and *Salmonella* serotypes Javiana and Infantis infections was higher. Compared with 2011–2013, incidence of STEC non-O157 and *Salmonella* serotype Infantis infection was significantly higher.

FIGURE 1. Relative rates of culture-confirmed infections with *Campylobacter*, STEC* O157, *Listeria*, *Salmonella*, and *Vibrio* compared with 2006–2008 rates, by year — Foodborne Diseases Active Surveillance Network, United States, 2006–2014†



* Shiga toxin–producing *Escherichia coli*.
† The position of each line indicates the relative change in the incidence of that pathogen compared with 2006–2008. The actual incidences of these infections cannot be determined from this figure.

FIGURE 2. Incidence per 100,000 population of culture-confirmed infection with *Salmonella* serotypes Typhimurium, Javiana, and Infantis, by year — Foodborne Diseases Active Surveillance Network, United States, 2006–2014



The decrease in the incidence of STEC O157 infections could be attributable to several factors related to food safety efforts. Today, because isolates are routinely sent to public health departments for subtyping by PulseNet,¶ and epidemiologists rapidly investigate clusters of illnesses in which bacteria have similar DNA fingerprints, the sources of outbreaks are identified faster than in the past, which allows contaminated products to be removed from the marketplace before more persons become ill. The most common sources of STEC O157 infection are beef and leafy vegetables (*1*). After STEC O157 was declared an adulterant in ground beef in 1994, public health officials identified many STEC O157 outbreaks that resulted in ground beef recalls. Substantial changes in beef industry practices and government policy** led to a decrease in ground beef contamination (*2*). Contamination of ground beef with STEC O157 has decreased.†† Producers of leafy vegetables have also made improvements after a large outbreak in 2006 (*3*). It is also possible that a portion of the decrease is related to the increasing use of culture-independent diagnostic tests without confirmatory culture.

The increasing incidence of non-O157 STEC infections is attributable, in part, to an increase in the number of laboratories testing for Shiga toxin and, consequently, increased recognition of non-O157 STEC infections (*4*). Six serogroups (O26, O45, O103, O111, O121, and O145) are considered adulterants in non-intact beef products or the components of these products. In 2012, USDA-FSIS began testing for non-O157 STEC in domestic and imported beef manufacturing trimmings.§§

Salmonella serotypes are diverse in reservoirs and sources. The unchanged overall incidence of salmonellosis masks substantial changes in infection with individual serotypes. Typhimurium, the most common serotype reported to FoodNet until 2009, has contaminated a wide variety of food sources, including cattle and poultry. The incidence of Typhimurium infections nationwide has been declining since the mid-1980s, for reasons that are unclear (*5*). An analysis of outbreak data from 1998 to 2008 estimated that 34% of Typhimurium infections were related to consumption of poultry (*1*). Decreases in contamination of whole chickens with *Salmonella* serotype Typhimurium, as reported by USDA-FSIS¶¶ (Kristin Holt, USDA-FSIS; personal communication, 2013–2014 data, 2015), might have contributed to the decline. In July 2011, USDA-FSIS tightened the performance standards for *Salmonella* on poultry carcasses, and, in December 2013, released an action plan to decrease contamination in regulated products.*** Poultry vaccines against *Salmonella* have been used increasingly, first

¶ PulseNet is the national molecular subtyping network for foodborne bacterial pathogens.

** The Federal Register notice is available at http://www.fsis.usda.gov/wps/wcm/connect/ed6d4959-a499-4e6e-af86-ae8a419ba156/00-022N.htm?MOD=AJPERES.
†† Data on ground beef contamination by year are available at http://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/microbiology/ec/positive-results-current-cy/positive-results-current-cy.
§§ More information is available at http://www.fsis.usda.gov/wps/portal/frame-redirect?url=http://www.fsis.usda.gov/OPPDE/rdad/FRPubs/2010-0023FRN.htm.
¶¶ FSIS serotype report through 2012 available at http://www.fsis.usda.gov/wps/wcm/connect/180fc804-0311-4b4d-ae42-d735e8232e1c/Salmonella-Serotype-Annual-2012.pdf?MOD=AJPERES.
*** More information is available at http://www.fsis.usda.gov/wps/wcm/connect/aae911af-f918-4fe1-bc42-7b957b2e942a/SAP-120413.pdf?MOD=AJPERES.

in egg-laying flocks, and to a lesser extent in broiler breeder flocks.[†††] *Salmonella* serotype Javiana infection is concentrated in southeastern states; the number of counties with annual infection rates above one case per 100,000 both inside and outside the southeast has increased markedly since the 1990s (*5*).

Additional regulations and ongoing industry efforts are likely to improve food safety. In January 2015, USDA-FSIS proposed new pathogen-reduction performance standards for *Salmonella* and *Campylobacter* in comminuted (reduced to minute particles) chicken and turkey products as well as raw chicken parts, such as chicken breasts, thighs, and wings.[§§§] In 2015, FDA plans to publish regulations for safer produce, processed foods, and imported foods, as mandated by the Food Safety Modernization Act (*6*). Vaccination of breeder poultry flocks, in combination with biosecurity measures, has been shown to reduce contamination of poultry meat (*7*).

The findings in this report are subject to at least four limitations. First, increasing use of culture-independent tests by clinical laboratories might affect the number of culture-confirmed infections reported; culture-independent testing might increase (as observed for STEC non-O157 infections) or decrease (because fewer cases might be diagnosed through traditional methods) reported incidence (*8*). Second, health care–seeking behaviors and other characteristics of the population in the surveillance area might affect the generalizability of the findings. Third, the proportion of illnesses transmitted by nonfood routes differs by pathogen; data provided in this report are not limited to infections from food. Finally, changes in incidence between periods can reflect year-to-year variation during those periods rather than sustained trends, and the number of infections and patterns observed might change as final data become available.

Progress has been made in decreasing contamination of some foods and reducing illness caused by some pathogens. However, little or no recent reductions for most infections have occurred. For example, *Campylobacter* and *Vibrio* rates are still higher than during 2006–2008, a pattern also observed in 2013 (*9*). More information is needed to understand sources of infection and changes in incidence, and to help determine where to target prevention efforts.

[†††] More information is available at https://www.avma.org/News/JAVMANews/Pages/101215x.aspx.

[§§§] The Federal Register notice is available at http://www.fsis.usda.gov/wps/wcm/connect/b711839a-c0b9-420f-9d74-8568310a1352/2014-0023.htm?MOD=AJPERES.

What is already known on this topic?

The incidence of many foodborne infections, including *Salmonella*, has been largely unchanged for many years. *Salmonella* infection is a complicated problem because infection can be acquired by many types of foods and from nonfood sources, so many different control methods are needed.

What is added by this report?

The 2014 data show progress in reducing infections from *Escherichia coli* O157 and *Salmonella* serotype Typhimurium. However, the incidence of infection with *Salmonella* serotypes Infantis and Javiana has increased.

What are the implications for public health practice?

Infections caused by *E. coli* serogroup O157 declined after targeted interventions to reduce contamination of ground beef were implemented. Similarly, to reduce the incidence of *Salmonella* infection, serotype-specific approaches are required. Public health, regulatory agencies, industry, and consumers can all play a role.

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Controlling the Last Known Cluster of Ebola Virus Disease — Liberia, January–February 2015

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As one of the three West African countries highly affected by the 2014–2015 Ebola virus disease (Ebola) epidemic, Liberia reported approximately 10,000 cases (*1*). The Ebola epidemic in Liberia was marked by intense urban transmission, multiple community outbreaks with source cases occurring in patients coming from the urban areas, and outbreaks in health care facilities (HCFs) (*2*,*3*). This report, based on data from routine case investigations and contact tracing, describes efforts to stop the last known chain of Ebola transmission in Liberia. The index patient became ill on December 29, 2014, and the last of 21 associated cases was in a patient admitted into an Ebola treatment unit (ETU) on February 18, 2015. The chain of transmission was stopped because of early detection of new cases; identification, monitoring, and support of contacts in acceptable settings; effective triage within the health care system; and rapid isolation of symptomatic contacts. In addition, a "sector" approach, which divided Montserrado County into geographic units, facilitated the ability of response teams to rapidly respond to community needs. In the final stages of the outbreak, intensive coordination among partners and engagement of community leaders were needed to stop transmission in densely populated Montserrado County. A companion report describes the efforts to enhance infection prevention and control efforts in HCFs (*4*). After February 19, no additional clusters of Ebola cases have been detected in Liberia.* On May 9, the World Health Organization declared the end of the Ebola outbreak in Liberia.

Evolution of the Cluster

The index patient in this cluster was a woman aged 50 years who became ill on December 29, 2014, in a community near St. Paul River Bridge in Montserrado County (Monrovia). After seeking care from an herbalist in her community, the patient presented to an HCF on January 4 with high fever, red eyes, and cough. Ebola was suspected, but she refused referral to an ETU and was sent home with antibiotics and antipyretics. On January 5, she was admitted to an ETU and died later that day. A postmortem swab of oral fluids tested positive for Ebola virus by polymerase chain reaction. Her family reported no known contact with other Ebola patients, although other Ebola cases had been reported in the same neighborhood. In addition, before her illness, the woman had traveled to Grand Cape Mount County, where Ebola virus transmission was ongoing.

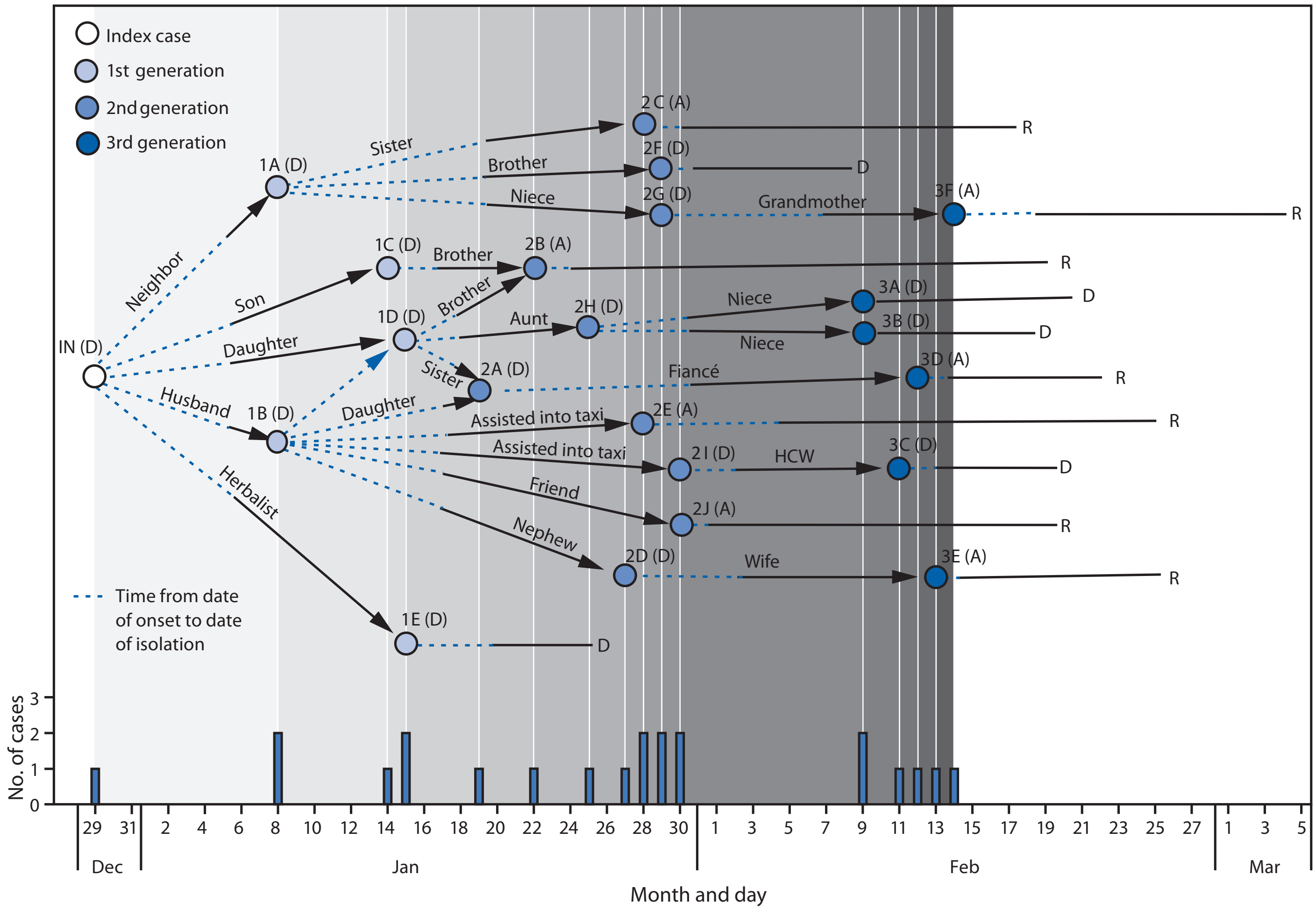
Over the following 7 weeks, 21 additional persons with laboratory-confirmed Ebola were linked to this case: 11 family members, six neighbors, two community members, one health care worker, and an herbalist (Figure 1). These cases occurred in three generations, all epidemiologically linked to the index case. The time interval from onset of illness to admission to an ETU decreased with each generation of cases. Twenty patients (including the index patient) received treatment at an ETU, including 13 patients who died. The two associated Ebola-infected persons who did not seek care in an ETU died in the community. Five first-generation patients were admitted to an ETU on average 6.0 days (range = 2–11 days) after illness onset. Ten second-generation patients averaged 4.7 days (range = 1–11 days) from symptom onset to ETU admission or death in the community. The six third-generation patients averaged 1.5 days (range = 0–4 days) from symptom onset to ETU admission (Table). The case-fatality rates among the successive generations were 100%, 60%, and 50%, respectively. Probable transmission for 18 of the cases (86%) occurred within 1 kilometer of St. Paul River Bridge in Montserrado County, whereas transmission for three cases occurred near Red Light, 15 kilometers southeast of St. Paul River Bridge (Figure 2).

Five patients worked in an HCF, three as cleaners (1A, 2C, and 3D) and two as health care providers (3A and 3C). However, the cleaners and one health care provider (3A) had significant household exposures with persons with confirmed Ebola that could account for their infection (Figure 1). One patient (1B) traveled to Red Light while symptomatic, became incapacitated in the community, and exposed two persons (2E and 2I) who assisted him into a taxi. One of these men later exposed patient 3C, a health care provider working in Red Light.

According to information provided by patients or their family during case investigations, several symptomatic patients sought care in counties outside of Montserrado to conceal

* Another single case occurred in a person who received a diagnosis of Ebola on March 20, 2015, and was not connected to this cluster (*5*).

FIGURE 1. Transmission diagram for the last known cluster of Ebola virus disease cases (N = 22) — Liberia, December 29, 2014–March 5, 2015*



Abbreviations: D = dead; A = alive; R = recovered.

* In this transmission network diagram, date of onset of Ebola symptoms of confirmed cases (dot) is followed by a period of infectiousness (dotted line); time from date or isolation or safe burial to onset of the next generation case (black arrow); and time from date of isolation or safe burial to final disposition (solid black line). Dot color represents generation. Cases are identified by a two character abbreviation: generation number and sequential lettering based on onset date. Survival status is indicated after each case abbreviation.

TABLE. Characteristics of patients with Ebola virus disease (Ebola) in the last known cluster of Ebola (N = 22*), by transmission generation — Liberia, January–February 2015

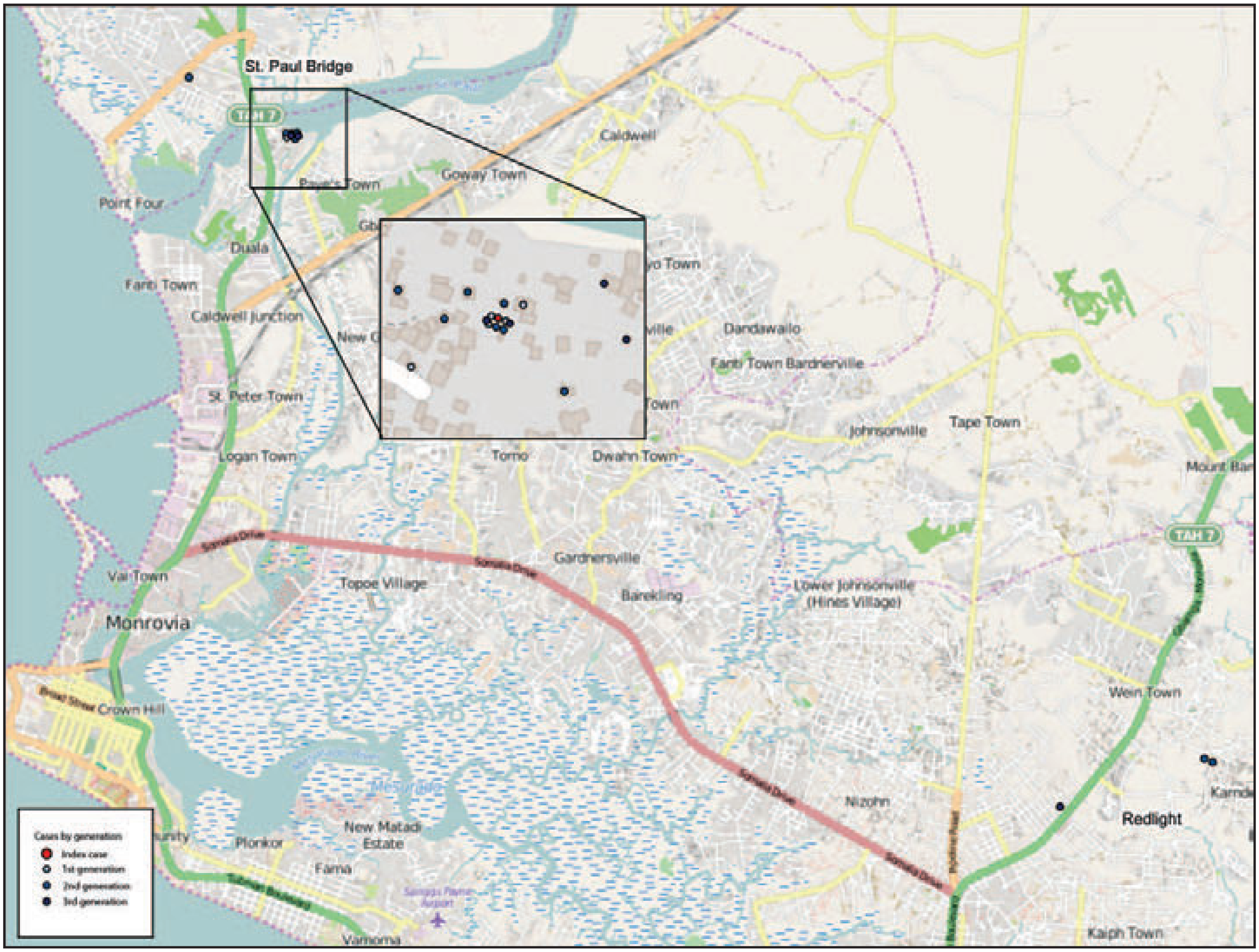
		Transmission generation		
Characteristic	Total (N = 22)*	1st (n = 5)	2nd (n = 10)	3rd (n = 6)
Average age (yrs) (range)	**36 (10–60)**	32 (10–60)	34 (13–55)	41 (24–58)
Average no. of symptomatic days in the community (range)	**4.2 (0–11)**	6 (2–11)	4.7 (1–11)	1.5 (0–4)
Female	**12**	2	5	4
Survived	**7**	0	4	3
Transmission location				
Montserrado County, Sector 2	**18**	5	8	4
Montserrado County, Sector 4	**3**	0	2	1
Margibi County	**1**	0	0	1
Initially listed as contact	**15**	3	6	6
Visited non-ETU while symptomatic	**8**	2	4	1

Abbreviation: ETU = Ebola treatment unit.
* Includes index patient.

their illness or obtain more affordable medical care. Patient 2A traveled from Montserrado to Bomi County to seek care at an ETU; 2G traveled to Bomi County to access an affordable appendectomy, but was turned back at a county checkpoint; 2H traveled from Montserrado to Lofa County and was transported by ambulance to an ETU in Bomi; and 2D, to avoid detection, traveled to Margibi County under a different name, sought care twice from a non-ETU HCF, and died there in the community (Figure 1). His wife (3E) resided in Margibi County and became infected while caring for him. At least eight patients sought care at non-ETU HCFs before their Ebola diagnosis in nine facilities in Montserrado County and one in Margibi County, exposing a total of 166 health care workers (*4*).

In several instances, challenges with HCF triage contributed to missing patients with suspect or probable Ebola. One patient

FIGURE 2. Ebola virus disease (Ebola) cases (N = 21) in the last known cluster of Ebola, by location and transmission generation — Montserrado County,* Liberia, January–February 2015



* N = 21 for Montserrado County; one other case in this cluster of 22 cases occurred in Margibi County.

(1A) tested positive for malaria and was sent home from an HCF. One initially afebrile patient (2G), with clinical symptoms consistent with appendicitis or pelvic inflammatory disease, received care at two clinics and was hospitalized at a third facility for 7 days before being transferred to an ETU. A symptomatic, high-risk contact (3C) under daily monitoring, presented for care at an ETU but was sent home despite a history of exposure to body fluids of a confirmed Ebola patient because his temperature was <100.4°F (<38.0°C). Two days later, he presented with symptoms at the non-ETU HCF where he worked and was sent to an ETU, where Ebola was confirmed.

Contact tracing identified 745 contacts for this cluster over the 6-week period, including the 166 health care workers from 10 HCFs (*4*). During the response to this cluster, considerable efforts were made to address the needs of high-risk contacts (e.g., those with documented exposure to body fluids of persons with confirmed Ebola). In some instances, contacts agreed to home-based quarantine, and groups of contacts agreed to facility-based observation (i.e., direct daily symptom and temperature monitoring in an HCF), where they could be immediately isolated if symptoms developed, without risk of community transmission. Incomplete contact tracing contributed to the persistence of this cluster; only 15 (68%) of the cases were in persons listed as known contacts; 60% of first- and second-generation and 100% of third-generation cases were in persons who were known contacts (Table). Several patients in the cluster denied Ebola symptoms or exposure to persons with confirmed Ebola when seeking care, reportedly because

What is already known on this topic?

During the initial phases of the 2014-2015 Ebola virus disease (Ebola) epidemic in Liberia, there was intense urban transmission, multiple community outbreaks with source cases occurring in patients coming from the urban areas, and outbreaks in health care facilities.

What is added by this report?

The last cluster of Ebola in Liberia included 22 cases, with three generations of transmission. Through enhanced control efforts, patients in successive generations were admitted to Ebola treatment units more quickly, mortality decreased, and community transmission was interrupted.

What are the implications for public health practice?

The last chain of transmission was controlled because of successful implementation of known strategies to control Ebola, including early detection of new cases; identification, monitoring, and support of contacts in acceptable settings; effective triage within the health care system; and rapid isolation of symptomatic contacts.

of fear of community stigma and apprehension of ETUs. At least one child (1D) was hidden from contact tracers when they visited. Persons who initially presented to non-ETU HCFs were less likely to be listed as contacts; two (25%) of eight persons who initially presented to non-ETUs were known contacts, compared with 13 (93%) of 14 who first presented for care at an ETU. Although guidance called for immediate isolation of symptomatic contacts, nine (75%) known contacts were isolated ≥2 days after symptom onset. The last confirmed case in this cluster (3F) was in a person admitted to an ETU on February 18 and discharged on March 5. The last cluster-associated contacts who did not become ill exited monitoring on March 11.

Discussion

This network of Ebola transmission in Liberia illustrated numerous challenges that persisted throughout the epidemic: fear of stigmatization in the community, delays in seeking treatment, inadequate triage in HCFs, lack of recognition of Ebola cases, and incomplete identification and follow-up of some contacts. The motivations for denying Ebola symptoms and resisting treatment are complex, but include stigma, fear, and denial related to possible Ebola infection, mistrust of ETUs, and low medical literacy. Despite the widespread availability of ETUs in Montserrado County, some persons opted for care at distant ETUs or care in non-ETU settings, where, consequently, large numbers of health care workers were exposed. Delayed treatment might have contributed to worse outcomes in the first two transmission generations compared with the last generation, when patients sought care more promptly. Triage systems did not fully prevent Ebola patients from being admitted to HCFs rather than ETUs. Despite these challenges, the last cluster of Ebola in Liberia was controlled because of successful implementation of known effective Ebola control strategies, including early detection of new cases; identification, daily monitoring, and support of contacts in acceptable settings; effective triage within the health care system; and rapid isolation of symptomatic contacts (*2*,*3*).

To improve case investigations and contact tracing, Montserrado County had coincidentally decentralized management of outbreak activities in the four geographic sectors. This decentralized, "sector" approach might have reduced the risk for community transmission. Each geographic sector had multidisciplinary teams led by coordinators located in each sector to manage and coordinate outbreak response activities at the sector, zone, and block level. Sector teams were empowered to make decisions related to control activities locally, and this enabled flexible adaptation of accepted outbreak control principles to fit local circumstances. Strategies included the use of home-based and community quarantine and facility-based observation, with provision of basic needs and psychosocial support, active case-finding, and outreach to religious and community leaders to allay the fears of affected households and community members. Although decentralization of sector management presented initial communication and coordination challenges, the enhanced sector-based efforts resulted in more complete contact tracing, more prompt isolation of symptomatic patients in the second and third generations of transmission, increased survival, and reduced transmission in the community.

As the threat of Ebola wanes, much needed non-Ebola health services are resuming in Liberia. However, comprehensive triage for Ebola (*3*) and appropriate personal protective equipment are crucial but cannot completely eliminate risk for Ebola transmission at HCFs. At least eight cases in the cluster described in this report were in patients who sought care at non-ETU HCFs; six (75%) of these were not listed as contacts, highlighting the critical importance of comprehensive contact tracing. These eight patients were treated by HCFs despite the universal requirement of triage. At least four patients in this cluster did not have fever when presenting for care; some HCFs and contact tracers used lack of fever as a *de facto* indicator to rule out Ebola (i.e., rather than completing a comprehensive triage), highlighting the limitations of temperature-based triage. Conversely, many non-Ebola patients had illnesses that met the case definition but could not be tested without transfer to an ETU, where care for their non-Ebola medical conditions would not be offered. Despite these challenges, only one of the exposed health care workers in this cluster became infected with Ebola, and no additional transmission occurred in HCFs, possibly because of timely, targeted infection prevention and control training and provision of personal protective equipment (*4*). Additionally, the most recent Ebola patient was appropriately triaged to an ETU when she presented to a non-ETU HCF (*5*).

In contrast to earlier in the Ebola epidemic, sector-based intensified contact tracing and in-depth case investigation, widespread infection prevention and control efforts (*3*), and coordination of case investigation and contact tracing activities between Montserrado and other counties (*6*) were key to stopping this final chain of Ebola transmission. The risk for re-introduction of Ebola into Liberia will remain high as long as transmission continues in the region. National efforts to strengthen surveillance, alert and response, border screening, and triage and infection prevention and control in HCFs are high-priority activities in the government of Liberia's recovery plan.

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Initiation of a Ring Approach to Infection Prevention and Control at Non-Ebola Health Care Facilities — Liberia, January–February 2015

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From mid-January to mid-February 2015, all confirmed Ebola virus disease (Ebola) cases that occurred in Liberia were epidemiologically linked to a single index patient from the St. Paul Bridge area of Montserrado County (*1*). Of the 22 confirmed patients in this cluster, eight (36%) sought and received care from at least one of 10 non-Ebola health care facilities (HCFs), including clinics and hospitals in Montserrado and Margibi counties, before admission to an Ebola treatment unit. After recognition that three patients in this emerging cluster had received care from a non-Ebola treatment unit, and in response to the risk for Ebola transmission in non-Ebola treatment unit health care settings (*2*), a focused infection prevention and control (IPC) rapid response effort for the immediate area was developed to target facilities at increased risk for exposure to a person with Ebola (Ring IPC). The Ring IPC approach, which provided rapid, intensive, and short-term IPC support to HCFs in areas of active Ebola transmission, was an addition to Liberia's proposed longer term national IPC strategy, which focused on providing a comprehensive package of IPC training and support to all HCFs in the country. This report describes possible health care worker exposures to the cluster's eight patients who sought care from an HCF and implementation of the Ring IPC approach. On May 9, 2015, the World Health Organization (WHO) declared the end of the Ebola outbreak in Liberia.*

St. Paul Bridge Cluster

The eight Ebola patients who sought care from an HCF ranged in age from 10 to 56 years; three were female. Only two of the eight were on a contact tracing list of persons with known prior Ebola exposure when they went to the HCF. Two patients died in the community and were never admitted to an Ebola treatment unit. For the other six, a median of 1 day passed (range = 0–9 days) between the first visit to an HCF and their admission to an Ebola treatment unit. For three patients with available data, a fever (defined as a temperature >100.4°F [>38°C] taken with an infrared thermometer) was not recorded on arrival at the HCF. Of the eight patients, seven subsequently died from Ebola.

Overall, 166 non-Ebola treatment unit health care workers in 10 HCFs possibly were exposed to the eight Ebola patients (Figure). The nature of their possible exposures varied, including providing treatment or performing laboratory tests on blood specimens of Ebola patients, or cleaning a room or mattress where an Ebola patient had slept. All 166 were placed on contact lists. Of these, 86 (52%) were placed under home-based quarantine or precautionary observation at an HCF because of relatively higher risk exposures, while the remainder were monitored by contact tracers, either at home or at their place of employment (Figure). One clinic was closed entirely (clinic D) (Figure) during the postexposure period of observation, and one inpatient section of a hospital was closed (hospital D) (Figure). One health care worker developed Ebola after debriding and suturing the lacerations of an Ebola patient who had sought care for treatment of injuries sustained in a fight, and both the patient and the health care worker died. None of the other 165 health care workers developed Ebola.

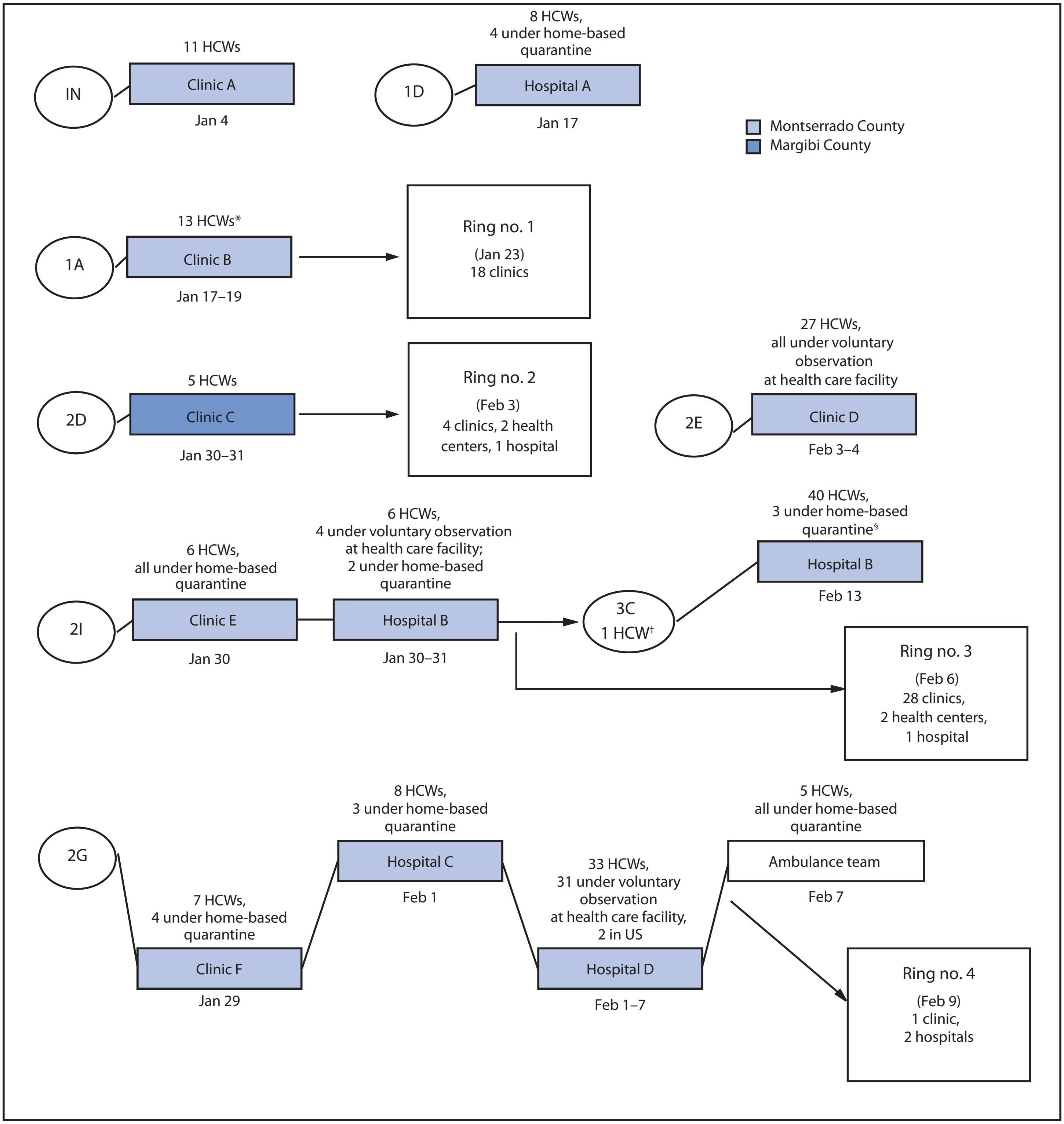
Observations of the 10 HCFs found that health care worker exposures could have occurred for multiple reasons. Triage systems were inadequate with limited or no triage or isolation structures, no use or inappropriate use of infrared thermometers, limited ability to elicit accurate contact exposure history, and an incomplete understanding of the case definition (suspected or probable) by some staff members. Additional challenges included no use or inappropriate use of personal protective equipment, insufficient staff to support IPC activities, and inconsistent oversight by IPC partners.

Ring IPC Strategy

Ring IPC was a collaboration of the Liberian Ministry of Health National and Montserrado Incident Management Systems, Montserrado and Margibi county health teams, CDC, WHO, the African Union, and nongovernmental organization partners under the Liberia IPC Task Force. On January 30, members of the IPC Task Force met to formalize components of the Ring IPC approach, including identification of target HCFs, a focus on triage, involvement of external staff members to support triage, and coordination and definition of roles among partners. The purpose of Ring IPC was to provide intensive IPC support (*3*,*4*) to HCFs in areas of active Ebola

* Additional information available at http://www.who.int/mediacentre/news/statements/2015/liberia-ends-ebola/en/.

FIGURE. Health care workers (HCWs) with exposure to eight Ebola patients at non-Ebola treatment units and targeted infection prevention and control (Ring IPC) initiation — Montserrado and Margibi counties, Liberia, January–February 2015



Abbreviations: IN = index patient for St. Paul Bridge cluster; 1A and 1D = other patients identified as first generation of cluster; 2D, 2E, 2G, and 2I = patients identified as second generation; 3C = patients identified as third generation.

* A sister of patient 1A who worked at Clinic B was exposed in her role as family caregiver.

† 3C, one of the 2 HCWs under quarantine at home, sought care at his place of employment while symptomatic.

§ The home-based quarantine period was extended for 3 patients previously under home-based quarantine from exposure to 3C.

What is already known on this topic?

The adoption of essential infection prevention and control (IPC) practices among health care workers, such as hand washing and proper use of personal protective equipment, is crucial to interrupting the transmission of Ebola.

What is added by this report?

From mid-January to mid-February 2015, all confirmed Ebola cases in Liberia were epidemiologically linked to a single index patient. Of the 22 confirmed patients in this cluster, eight (36%) sought and received care from at least one of 10 non-Ebola health care facilities. During this time, a focused IPC response effort, termed Ring IPC, was developed collaboratively to target health care facilities at increased risk for exposure to a person with Ebola. Rapid, intensive, and short-term IPC support was provided at these health care facilities following rapid needs assessments focused on triage procedures and personal protective equipment use.

What are the implications for public health practice?

The implementation of Ring IPC in Liberia might offer a useful model for rapid response to Ebola virus transmission and health care worker exposure in other settings. A comprehensive strategy remains critical to raising the level of IPC capacity nationwide; however, an appropriately targeted Ring IPC approach might be an effective supplemental strategy to focus IPC support in response to clusters of disease.

transmission, thus forming a strategically placed protective ring of intensified IPC attention around persons with known Ebola to help break the chain of transmission. This strategy entailed selecting target HCFs for Ring IPC intervention based on known health care worker exposure to an Ebola patient, neighboring HCFs around the HCF that treated a patient, or HCFs in close proximity to the residence of a patient with confirmed Ebola. Next, rapid IPC needs assessments were conducted at these HCFs using Ministry of Health and Social Work (MOHSW) approved assessment tools (*5*). These assessments focused on triage procedures and personal protective equipment use, and found inadequate or absent triage and isolation structures, gaps in the personal protective equipment supply chain, and a need for general IPC training in addition to specialized triage training.

Training and Equipment

Identified challenges were addressed by the national IPC Task Force developing training that targeted key personnel. Triage training, based on existing MOHSW-approved IPC training materials, was developed and provided to 47 African Union clinicians. These clinicians were deployed to 36 target HCFs in Monteserrado County to provide onsite daily triage mentoring and support for the duration of the high-risk exposure monitoring period, or for at least 2 weeks. Three nurses, previously employed by an Ebola treatment unit, provided similar triage support for one hospital. In addition, three 1-day triage training sessions were provided for more than 125 staff members working in three target HCFs. In Margibi County, a 1-day triage training session was conducted for 11 staff members working in five target HCFs, and African Union staff and nurses or other county health staff members provided ongoing triage mentoring and IPC support to seven target HCFs. This intensive IPC approach served to alert health care workers to recent Ebola virus transmission in their communities, identify additional contacts at HCFs where Ebola virus exposure had occurred, and provide a secondary source (in addition to contact tracing) of information on the health status of exposed health care workers.

In response to heightened awareness of clinic needs, partners provided personal protective equipment and other essential IPC supplies to target facilities. Ring IPC partners in Montserrado County and the national IPC Task Force initiated an emergency release of a 1-month supply of personal protective equipment to priority clinics. Nongovernmental organization partners assessed and constructed triage structures when needed.

Initiation of Rings

During January 23–February 9, in response to the ongoing St. Paul Bridge cluster, four IPC rings were initiated in Liberia, three in Montserrado County and one in Margibi County (Figure). The first ring was initiated 4 days after recognition that a facility had provided care to an Ebola patient; subsequent rings were initiated within 2 days after recognition of other Ebola patients. In total, 59 target HCFs were identified, 52 in Montserrado County (out of a total of 294 HCFs) and seven (out of a total of 32) in Margibi County. There was an average of 15 HCFs per ring (range = 3–31).

Overall, Ring IPC efforts appeared to be associated with an increase in the identification and isolation of suspected or probable Ebola patients. For example, three probable Ebola patients were identified through triage during training conducted at one target HCF in Montserrado County. Only one of the 166 exposed health care workers in the St. Paul Bridge cluster became infected with Ebola. This low prevalence of secondary infection among health care workers suggests that basic infection prevention principles were being observed by health care workers during this period. Nevertheless, triage was not always completely successful; the one health care worker who became infected with Ebola after Ring IPC activities were initiated actually sought care at his place of employment, an identified target HCF, and was permitted to enter without first being properly triaged as a probable or suspect Ebola patient.

Discussion

Included among the Ebola response efforts in Liberia was the creation in early September 2014 of a national IPC Task Force to support the MOHSW. The IPC Task Force served as a coordinating body to facilitate IPC planning and implementation of activities in both health care and non–health care facilities, as well as providing IPC guidance and technical assistance through policy development and standardization of IPC training and implementation tools consistent with MOHSW priorities. The national IPC strategy had focused on providing a comprehensive package of IPC training and support, through trained IPC specialists, at major health facilities throughout the country because of widespread Ebola transmission occurring at the time. This strategy includes promoting essential IPC practices among health care workers, such as hand washing and proper use of personal protective equipment. Although a comprehensive strategy remains critical to raising the level of IPC capacity nationwide, an appropriately targeted Ring IPC approach might be an effective supplemental strategy to focus IPC support in response to clusters of disease.

The public health intervention described in this report was rapidly implemented and integrated into Liberia's national Ebola response as a result of coordinated, collaborative efforts by multiple partners. Coordination and collaboration among the national Incident Management System, county health teams, CDC, WHO, African Union and nongovernmental organization partners was key to identifying gaps in IPC needs and preventing duplication of efforts. The initial ring was coordinated by the IPC Task Force under MOHSW leadership. In subsequent rings, the national Incident Management System and county health departments joined efforts with CDC, WHO, African Union, and multiple nongovernmental organization partners participating in initial discussions, planning, and rapid IPC assessments. In general, HCFs welcomed additional training, personal protective equipment provision, and triage mentoring and support. The placement of IPC staff members trained in triage at target HCFs following training was readily adopted by clinic staff.

The implementation of Ring IPC in Liberia might offer a useful model for rapid response to Ebola virus transmission and health care worker exposure in other settings. This approach, however, might be most appropriate at the beginning or near the end of an outbreak, when specific chains of transmission can be identified and when HCFs can be identified and targeted based on their risk for encountering an Ebola patient when there is known active transmission in their geographical area. Urban settings present challenges to this approach, because persons might seek care at HCFs outside of their immediate community. Although limitations in both supplies (personal protective equipment and infrared thermometers) and human resources (appropriately trained personnel) might inhibit a timely response to initiating IPC activities, the Ring IPC approach might be used to prioritize these limited resources.

The Ring IPC approach was developed rapidly and collaboratively in response to an urgent public health need; as such, data were not collected and aggregated systematically across all facilities, potentially limiting the generalizability of these results. Nonetheless, as a result of Ring IPC efforts, health care workers at HCFs in areas with recent active transmission are now better equipped and trained to rapidly triage, isolate, and refer suspected and probable Ebola patients to appropriate Ebola treatment unit facilities. As Liberia looks ahead, a new culture of IPC can be incorporated into the health system; a Ring IPC approach might be useful in minimizing the transmission in non-Ebola HCFs should new cases of Ebola occur.

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[1]Ministry of Health and Social Work, Liberia; [2]Montserrado Incident Management System; [3]Montserrado County Health Team; [4]C.H. Rennie Hospital; [5]African Union; [6]World Health Organization; [7]CDC; [8]Epidemic Intelligence Service; [9]National Institute for Occupational Safety and Health, CDC; [10]University of Witwatersrand.

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Announcement

Click It or Ticket Campaign — May 18–31, 2015

Click It or Ticket, a national campaign coordinated annually by the National Highway Traffic Safety Administration to increase the proper use of seat belts, takes place May 18–31, 2015.

Using a seat belt is one of the most effective ways to prevent serious injury or death in the event of a crash. Using lap/shoulder seat belts can reduce the risk of fatal injury by almost 50% (*1*). In 2013, more than 21,000 passenger vehicle occupants died in motor vehicle crashes in the United State; 49% were unrestrained at the time of the crash (*2*). An additional 2.4 million nonfatal injuries were treated in emergency departments in 2013 (*3*). Yet, millions of persons continue to travel unrestrained (*4*).

During the 2015 Click it or Ticket campaign,* law enforcement agencies across the nation will conduct intensive, high-visibility enforcement of seat belt laws, during both daytime and nighttime hours. Nighttime enforcement of seat belt laws is encouraged because seat belt use is lower at night (*2*).

* Additional information is available at http://www.nhtsa.gov/Driving+Safety/Occupant+Protection.

Additional information from CDC on preventing motor vehicle crash-related injuries is available at http://www.cdc.gov/Motorvehiclesafety. Information on state-specific seat belt use and strategies to improve it is available at http://www.cdc.gov/motorvehiclesafety/seatbelts/states.html.

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Announcement

American Stroke Month and National High Blood Pressure Education Month — May 2015

May 2015 is American Stroke Month and National High Blood Pressure Education Month. American Stroke Month raises awareness of the signs and symptoms of stroke and encourages persons to act F.A.S.T.* (Face drooping, Arm weakness, Speech difficulty, Time to call 9–1–1) if someone is having a stroke. Stroke is the fifth leading cause of death in the United States and a leading cause of severe disability (*1*,*2*). In the United States, on average, one person dies from stroke every 4 minutes (*2*).

Stroke is largely preventable. You may be able to prevent stroke or reduce your risk through healthy lifestyle changes. High blood pressure is one of the major risk factors for stroke. Others include high cholesterol, smoking, diabetes, heart disease, obesity, physical inactivity, and unhealthy diet.†

National High Blood Pressure Education Month focuses on saving lives by increasing awareness and educating the public about cardiovascular disease risks and how to prevent them. High blood pressure, also known as hypertension, is considered the "silent killer" because it can damage the heart, brain, and kidneys without any symptoms (*2*). In the United States, nearly one in three adults has hypertension, and only about half have their condition under control (*3*). Hypertension is the leading risk factor for stroke and heart attacks. Each day in the United States, more than 1,000 deaths are associated with hypertension (*2*).

To control hypertension and reduce their risk for stroke, patients can take medications as directed, monitor their blood pressure, and eat a lower-sodium diet and more fruits and vegetables. Health care providers can use electronic health records, blood pressure measurement, and a team-based care approach to help improve their patients' hypertension control. Patients and providers can find more information at http://millionhearts.hhs.gov/abouthds/prevention.html.

CDC focuses on promoting cardiovascular health, improving quality of care for all, and eliminating disparities associated with heart disease and stroke. Additional information is available at http://www.cdc.gov/bloodpressure and http://www.cdc.gov/stroke.

* More information is available at http://www.strokeassociation.org/STROKEORG/AboutStroke/AmericanStrokeMonth/American-Stroke-Month_UCM_459942_SubHomePage.jsp.

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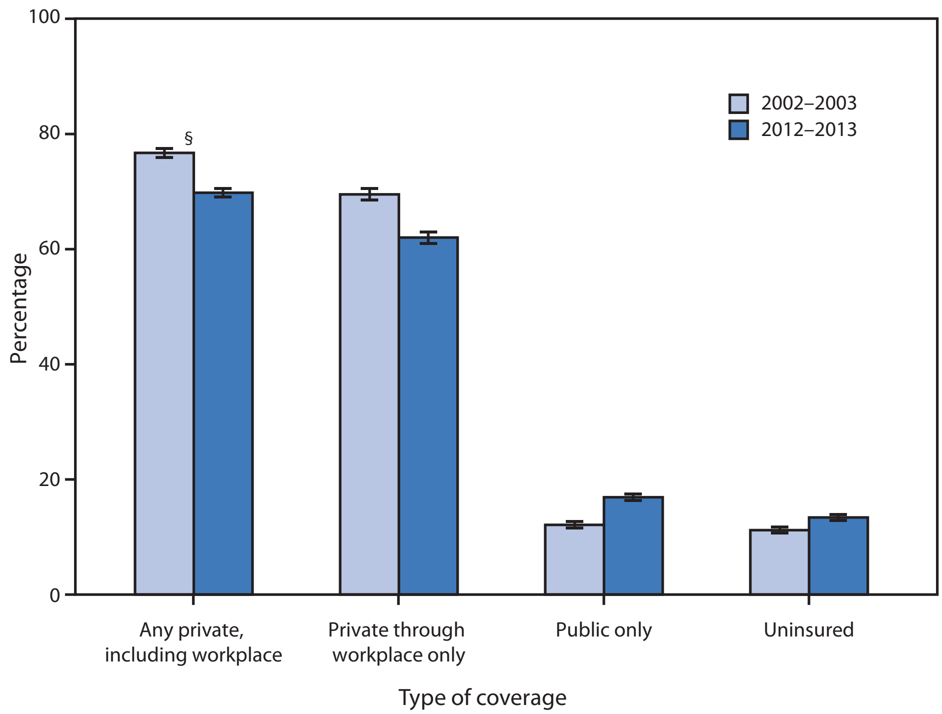
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Health Insurance Coverage Among Adults Aged 55–64 Years, by Type of Coverage* — National Health Interview Survey, United States, 2002–2003 and 2012–2013†



* Information on health insurance coverage is collected at the time of interview. Three of the four categories (any private, including workplace; public only [Medicare, Medicaid, military, and state/local government plans]; and uninsured) are mutually exclusive, but might not sum to 100% because of rounding.
† Estimates are based on household interviews of a sample of the civilian noninstitutionalized U.S. population and are derived from the National Health Interview Survey family core.
§ 95% confidence interval.

In 2012–2013, persons aged 55–64 years were less likely to have private health insurance coverage (69.8%) than persons in the same age group in 2002–2003 (76.7%); persons in the 2012–2013 age group also were less likely to have private coverage through the workplace (62.0%) than persons in the same age group in 2002–2003 (69.5%). Also, in 2012–2013, a greater percentage aged 55–64 years had only public health insurance coverage (16.9%) than in 2002–2003 (12.1%) and a greater percentage were uninsured (13.4%) than in 2002–2003 (11.2%).

Source: Health, United States, 2014 with special feature on the health of the current 55–64 year age group who within the next 10 years will enter the Medicare program. Available at http://www.cdc.gov/nchs/hus.htm.

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