Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 63 / No. 40
October 10, 2014

Alcohol Involvement in Opioid Pain Reliever and Benzodiazepine Drug Abuse–Related Emergency Department Visits and Drug-Related Deaths — United States, 2010

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The abuse of prescription drugs has led to a significant increase in emergency department (ED) visits and drug-related deaths over the past decade. Opioid pain relievers (OPRs) and benzodiazepines are the prescription drugs most commonly involved in these events (*1,2*). Excessive alcohol consumption also accounts for a significant health burden and is common among groups that report high rates of prescription drug abuse (*1,3,4*). When taken with OPRs or benzodiazepines, alcohol increases central nervous system depression and the risk for overdose (*5*). Data describing alcohol involvement in OPR or benzodiazepine abuse are limited. To quantify alcohol involvement in OPR and benzodiazepine abuse and drug-related deaths and to inform prevention efforts, the Food and Drug Administration (FDA) and CDC analyzed 2010 data for drug abuse–related ED visits in the United States and drug-related deaths that involved OPRs and alcohol or benzodiazepines and alcohol in 13 states. The analyses showed alcohol was involved in 18.5% of OPR and 27.2% of benzodiazepine drug abuse-related ED visits and 22.1% of OPR and 21.4% of benzodiazepine drug-related deaths. These findings indicate that alcohol plays a significant role in OPR and benzodiazepine abuse. Interventions to reduce the abuse of alcohol and these drugs alone and in combination are needed.

The Substance Abuse and Mental Health Services Administration's Drug Abuse Warning Network (DAWN) has been used to track the impact of drug use in the United States by monitoring hospital ED visits (DAWN ED) and drug-related deaths (DAWN ME) (*1,6*). DAWN collects data on illegal drugs, prescription and over-the-counter medications, and dietary supplements. In addition, DAWN collects information on alcohol involvement in these events. To be included in the DAWN database, the drug use (including alcohol) must be involved in the ED visit or death. Only drugs that are determined to be involved are recorded in the DAWN system. Unrelated drugs that are simply present are not recorded.

This report uses data from the 2010 DAWN ED public use file.* To estimate national ED visits, data were collected from a stratified, simple random sample of nonfederal, short-stay,

*Additional information available at http://www.icpsr.umich.edu/icpsrweb/samhda.

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general hospitals that operate 24-hour EDs. Poststratified weights were applied to the data from participating hospitals. This analysis included data from 237 hospitals on ED visits associated with drug misuse or abuse (referred to as abuse in this report), which is defined by DAWN ED as the group of ED visits that involve illicit drugs, alcohol-related visits (alcohol in combination with other drugs or alcohol alone for persons aged <21 years), and nonmedical use of pharmaceuticals (*1*). Nonmedical use is defined as taking more than prescribed, use without a prescription, taking a drug prescribed for someone else, malicious poisoning, and documented substance abuse involving pharmaceuticals. ED visits for suicide attempts and detoxification are included in the abuse category if illicit drugs are involved. Cases included those drug abuse–related ED visits that involved alcohol and OPRs or alcohol and benzodiazepines, whether alone or in combination with other drugs. ED visits involving more than one type of drug were counted in multiple categories. Estimates were suppressed if the relative standard error was >50% or if the estimate was based on fewer than 30 cases.

To complement the national ED visit data, 2010 data on deaths from DAWN ME from 13 states provided to CDC by SAMHSA also were used. In 2010, DAWN ME collected information on drug-related deaths referred to medical examiners and coroners (ME/Cs) in 373 counties in 157 metropolitan areas and 450 counties in 13 states. Data included in this analysis come from the 13 states that submitted data to DAWN ME (Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Mexico, Oklahoma, Oregon, Rhode Island, Utah, Vermont, Virginia, and West Virginia). Cases were identified through a retrospective review of decedent case files. For this analysis, a case was any death determined by the ME/C to be related to drug use in which alcohol and OPRs or alcohol and benzodiazepines were involved, whether alone or in combination with other drugs. The drug use might have been for legitimate, therapeutic purposes or for the purpose of drug abuse or misuse. Per standard DAWN ME suppression rules, counts of deaths that were less than four but greater than zero were suppressed (*6*).

Percentages of drug abuse–related ED visits and drug-related deaths that involved alcohol were calculated for all OPRs and benzodiazepines as well as specific OPRs (fentanyl, hydrocodone, hydromorphone, methadone, oxycodone, and tramadol) and benzodiazepines (alprazolam, clonazepam, diazepam, and lorazepam), by age group, and by sex (for ED visits only). Percentages of drug abuse-related ED visits and drug-related deaths were calculated for both any ED visit or death that involved alcohol and OPRs, or alcohol and benzodiazepines, and for those ED visits and deaths where OPRs or benzodiazepines were the only drug class combined with alcohol. Because of public file formatting, age groups differed for ED visits and deaths. Sex was not available for drug-related deaths in the DAWN ME data file provided to CDC by SAMHSA. Differences in ED visits among various OPRs and benzodiazepines were tested using two-sided t tests. Risk ratios and associated 95% confidence intervals (CIs)

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

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR 2014;63:[inclusive page numbers].

were calculated to compare drug-related deaths caused by various OPRs and benzodiazepines.

Based on DAWN ED estimates, in 2010 in the United States, there were 438,718 ED visits related to OPR abuse and 408,021 ED visits related to benzodiazepine abuse, alone or in combination with other drugs. Of the OPR ED visits, an estimated 81,365 (18.5%) involved alcohol; of the benzodiazepine ED visits, 111,165 (27.2%) involved alcohol (Table 1). When restricted to ED visits where OPRs or benzodiazepines were the only drug classes involved, alcohol was involved in 26,446 (13.8%) OPR visits and 38,244 (34.1%) benzodiazepine visits.

Of the 3,883 OPR deaths in the 13-state DAWN ME data in 2010, 860 (22.1%) involved alcohol. For benzodiazepines, 324 (21.4%) of the 1,512 deaths involved alcohol (Table 2). Among single-drug class deaths, 393 (26.1%) OPR and 44 (72.1%) benzodiazepine deaths involved alcohol. OPRs stronger than hydrocodone, such as fentanyl, methadone, and hydromorphone, tended to have less alcohol involvement for both ED visits and deaths.

In 2010, the percentage of ED visits that involved OPRs and alcohol was highest among persons aged 30–44 years (20.6%) and 45–54 years (20.0%) (Figure). For benzodiazepine ED visits, the percentage was highest among persons aged 45–54 years (31.1%). ED visits involving alcohol and OPRs or alcohol and benzodiazepines were significantly more common among men than women: 22.9% (CI = 18.7%–27.7%) for men for OPRs compared with 13.5% (CI = 11.1%–16.4%) for women and 30.6% (CI = 26.7%–34.8%) for men for benzodiazepines compared with 24.1% (CI = 19.6%–29.2%) for women.

TABLE 1. Numbers and percentages of opioid pain reliever and benzodiazepine drug abuse–related emergency department visits that involved alcohol — United States, 2010

	Alcohol and one or more drugs involved in emergency department visit		
	No.*	(%)*	(95% CI)
Opioid pain relievers	81,365	(18.5)	(15.3–22.3)
fentanyl/combinations	2,355	(10.2)†	(5.7–17.7)
hydrocodone/combinations	26,143	(22.6)	(19.8–25.7)
hydromorphone/combinations	2,619	(12.6)†	(7.7–20.0)
methadone	13,204	(17.3)	(9.4–29.8)
morphine/combinations	4,452	(13.1)†	(6.9–23.3)
oxycodone/combinations	35,878	(19.6)	(15.1–25.1)
tramadol/combinations	3,523	(19.7)	(12.5–29.6)
Benzodiazepines	111,165	(27.2)	(23.2–31.7)
alprazolam	39,573	(26.0)	(21.9–30.6)
clonazepam	22,089	(30.1)	(24.4–36.4)
diazepam	9,214	(28.8)	(21.7–37.2)
lorazepam	15,355	(34.6)	(25.7–44.6)
	Alcohol and single drug class involved in emergency department visit		
	No.§	(%)§	(95% CI)
Opioid pain relievers	26,446	(13.8)	(10.4–18.0)
fentanyl/combinations	—¶	—	—
hydrocodone/combinations	7,251	(24.0)	(16.2–33.9)
hydromorphone/combinations	—	—	—
methadone	3,047	(11.9)†	(6.7–20.4)
morphine/combinations	396	(3.5)†	(1.5–8.0)
oxycodone/combinations	10,160	(15.9)	(9.9–24.5)
tramadol/combinations	818	(14.5)	(7.7–25.7)
Benzodiazepines	38,244	(34.1)	(29.5–39.0)
alprazolam	13,063	(31.4)	(25.6–37.9)
clonazepam	7,734	(33.6)	(27.1–40.9)
diazepam	2,622	(36.2)	(24.1–50.4)
lorazepam	5,207	(29.4)	(20.9–39.7)

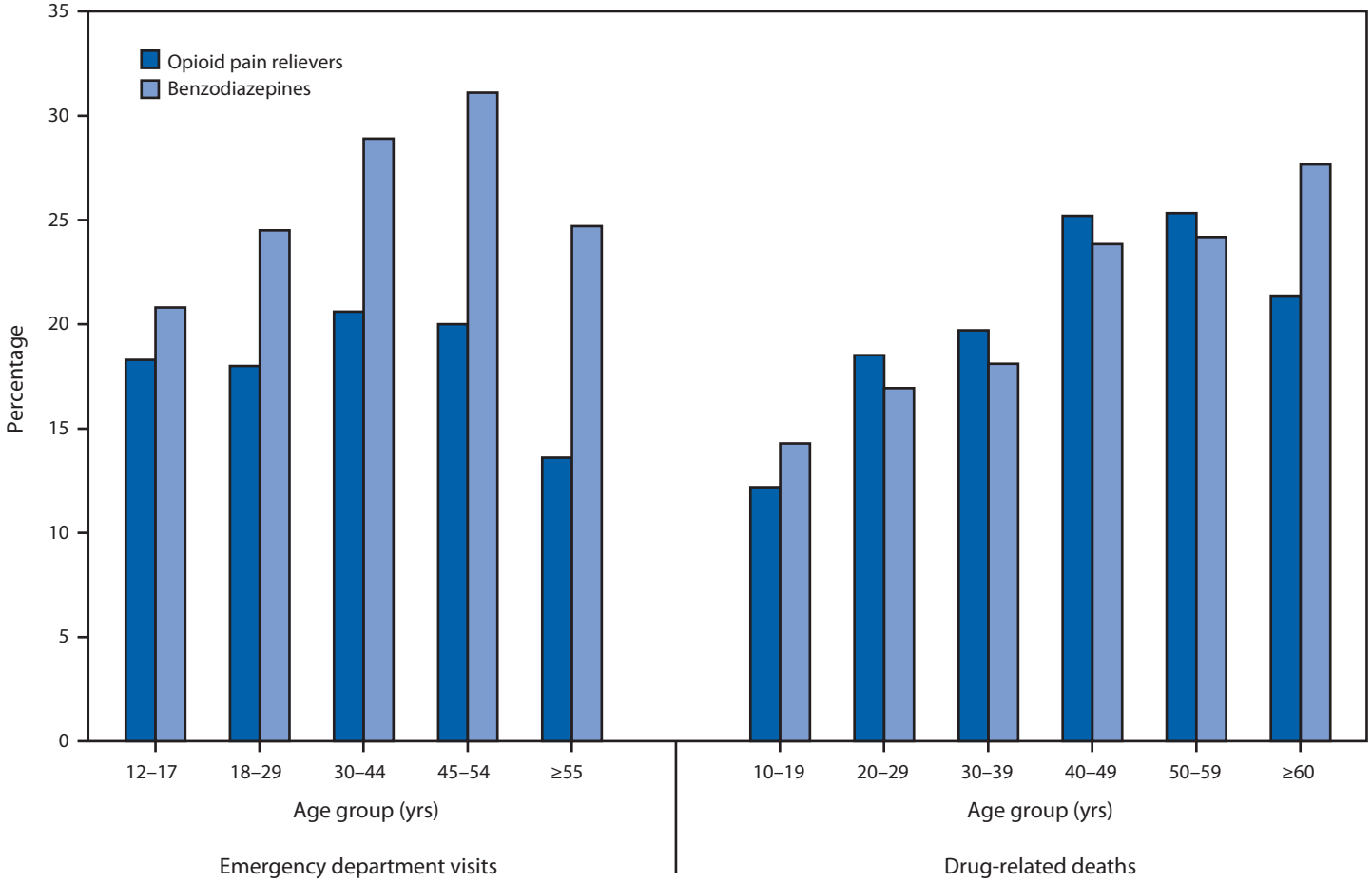
Abbreviation: CI = confidence interval.
* Number and percentage of emergency department visits for abuse of drugs in one or more drug class that involved alcohol.
† Among opioid pain relievers, percentage is significantly (p<0.05) different from the percentge for hydrocodone/combinations. There were no statistically significant differences among benzodiazepines.
§ Number and percentage of emergency department visits for abuse of drugs in a single drug class that involved alcohol.
¶ Suppressed because of a relative standard error greater than 50% or an estimate based on fewer than 30 cases.

TABLE 2. Numbers and percentages of opioid pain reliever and benzodiazepine drug–related deaths that involved alcohol — 13 states, 2010

	Alcohol and one or more drugs involved in emergency department visit			
	No.*	(%)*	RR	(95% CI)
Opioid pain relievers	860	(22.1)		
fentanyl/combinations	59	(17.0)	0.67	(0.51–0.87)†
hydrocodone/combinations	169	(25.5)	1.00	(referent)
hydromorphone/combinations	19	(23.8)	0.99	(0.62–1.41)
methadone	159	(16.3)	0.64	(0.53–0.78)†
morphine/combinations	161	(22.8)	0.90	(0.74–1.08)
oxycodone/combinations	304	(22.9)	0.90	(0.76–1.06)
tramadol/combinations	35	(15.9)	0.63	(0.45–0.87)†
Benzodiazepines	324	(21.4)		
alprazolam	145	(18.1)	1.00	(referent)
clonazepam	38	(18.9)	1.04	(0.76–1.44)
diazepam	85	(18.9)	1.04	(0.82–1.33)
lorazepam	21	(24.4)	1.35	(0.90–2.01)
	Alcohol and single drug class involved in emergency department visit			
	No.§	(%)§	RR	(95% CI)
Opioid pain relievers	393	(26.1)		
fentanyl/combinations	19	(19.0)	0.44	(0.27–0.71)†
hydrocodone/combinations	30	(43.5)	1.00	(referent)
hydromorphone/combinations	4	(66.7)	1.53	(0.82–2.87)
methadone	61	(17.4)	0.40	(0.28–0.57)†
morphine/combinations	58	(31.7)	0.73	(0.52–1.03)
oxycodone/combinations	104	(35.3)	0.81	(0.59–1.11)
tramadol/combinations	4	(13.3)	0.31	(0.12–0.79)
Benzodiazepines	44	(72.1)		
alprazolam	18	(66.7)	1.00	(referent)
clonazepam	—¶	—	—	—
diazepam	8	(80.0)	1.20	(0.80–1.81)
lorazepam	0	(0)		

Abbreviations: RR = risk ratio; CI = confidence interval.
* Number and percentage of deaths from abuse of drugs in one or more drug class that involved alcohol.
† Among opioid pain relievers, percentage is significantly (p<0.05) different from the percentge for hydrocodone/combinations. There were no statistically significant differences among benzodiazepines.
§ Number and percentage of deaths from abuse of drugs in a single drug class that involved alcohol.
¶ Suppressed because death totals were greater than zero but less than four.

FIGURE. Percentage of opioid pain reliever and benzodiazepine drug abuse–related emergency department visits in the United States and drug-related deaths in 13 states that involved alcohol, by age group — Drug Abuse Warning Network, 2010



Among OPR deaths, persons aged 40–49 years (25.2%) and 50–59 years (25.3%) had the highest percentage of alcohol involvement. For benzodiazepine-related deaths, the highest percentage (27.7%) was among persons aged ≥60 years (Figure).

Discussion

Alcohol was commonly involved in ED visits resulting from the abuse of OPRs or benzodiazepines as well as in deaths related to these drugs. Nearly one fifth of OPR abuse–related ED visits and more than one fourth of benzodiazepine abuse–related ED visits involved alcohol. Slightly more than one fifth of drug related deaths involved OPRs and alcohol and the same proportion applied to benzodiazepines and alcohol. Alcohol was more likely to be involved in single-drug class ED visits and deaths involving benzodiazepines compared with OPRs.

Alcohol involvement was higher in single-drug class ED visits for benzodiazepines compared with all ED visits involving benzodiazepines as well as single drug-class deaths for both OPRs and benzodiazepines compared with all deaths involving these drugs; this was especially pronounced for the benzodiazepine single-drug class deaths, for which 72.1% involved alcohol. This finding is consistent with the well characterized increase in central nervous system depression and overdose risk that results when alcohol is combined with these types of substances (*5*). It also indicates that benzodiazepines and weaker OPRs are less likely to cause such events without the additive effect of alcohol.

The percentage of alcohol involvement in ED visits for both OPRs and benzodiazepines was higher for men compared with women. Men report higher prevalence, frequency, and intensity of binge drinking compared with women, and this might have contributed to the higher percentage of alcohol involvement in ED visits among men seen in this study (*3*).

The results of the FDA and CDC analysis are consistent with previous reports. In West Virginia in 2006, 17.3% of unintentional pharmaceutical overdose deaths had alcohol as a contributing factor (*7*). In the National (Nationwide) Inpatient Sample, the largest publicly available all-payer inpatient health

What is already known on this topic?

Opioid pain reliever and benzodiazepine abuse–related emergency department (ED) visits and drug-related deaths have increased significantly in the past decade. There is limited information on how often alcohol was involved in these events.

What is added by this report?

Based on data from a sample of EDs participating in the Drug Abuse Warning Network, alcohol was involved in an estimated 18.5% of opioid-related ED visits and 27.2% of benzodiazepine-related ED visits in the United States in 2010. The same year, based on medical examiner and coroner data from 13 states participating the Drug Abuse Warning Network, alcohol was involved in 22.1% of opioid-related deaths and 21.4% of benzodiazepine-related deaths. Compared with opioid pain relievers, alcohol was more likely to be involved in benzodiazepine ED visits (34.1% versus 13.8%) or deaths (72.1% versus 26.1%) when benzodiazepines were the only drugs involved.

What are the implications for public health practice?

Alcohol is involved in a significant proportion of opioid and benzodiazepine drug abuse–related ED visits and drug-related deaths. Interventions to educate health care providers and the public about the dangers of combining these substances need to be strengthened. Interventions that support early identification of and intervention in patients with alcohol and drug abuse problems should be integrated into the primary health care system.

care database in the United States,[†] among persons aged 18–24 years, alcohol overdose was present in 20% of overdoses of opioids and related narcotics. Men had significantly higher rates: 25% compared with 15% for women, and were more likely to be hospitalized for overdoses combining opioids and alcohol. The nationwide study also found that the percentage of overdoses combining alcohol and drugs was higher among persons aged ≥25 years compared with those aged 18–24 years (*8*).

The findings in this report are subject to at least six limitations. First, the drugs (including alcohol) involved in ED visits and deaths might not all have been identified and documented. Second, distinguishing drugs taken for nonmedical and medical reasons is not always possible, especially when multiple drugs are involved. Third, DAWN ME does not rely on a statistical sampling of ME/Cs; findings cannot be considered representative of ME/Cs who did not participate, and results from the 13 states cannot be extrapolated to the entire United States. Fourth, state laws dictate which deaths are subject to ME/C review, and these laws vary by state. Fifth, toxicology testing practices vary depending on local concerns, funding, and testing technology, which affects the number of deaths determined to be DAWN ME cases and the number of deaths attributed to particular drugs. Finally, it was not possible to ascertain the amount of alcohol consumed, which limited the ability to look at outcomes by alcohol consumption level.

The fact that approximately one fifth of OPR drug abuse–related ED visits and drug-related deaths involve alcohol suggests the need for stronger prevention measures to mitigate this significant public health problem. OPRs and benzodiazepines are prescribed and dispensed by health care providers, and this presents an opportunity to discuss their risks, especially the serious risk of central nervous system depression when combined with alcohol or other depressants. However, only 16% of adults in the United States have discussed alcohol consumption with a health professional (*9*), and the percentage discussing other substance use is unknown. Interventions such as combined prevention programs that target alcohol and prescription drug abuse, systematic provider and patient education, and integration of screening and intervention services into the primary care health system to enable early identification of problematic alcohol and drug use might reduce the number of ED visits and deaths related to drug abuse and alcohol.

[†] Additional information available at http://www.hcup-us.ahrq.gov/nisoverview.jsp.

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Hispanics or Latinos Living with Diagnosed HIV: Progress Along the Continuum of HIV Care — United States, 2010

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The goals of the National HIV/AIDS Strategy are to reduce new human immunodeficiency virus (HIV) infections, increase access to care and improve health outcomes for persons living with HIV, and reduce HIV-related health disparities (*1*). In July 2013, by presidential executive order, the HIV Care Continuum Initiative was established, focusing on accelerating federal efforts to increase HIV testing, care, and treatment (*2*). Hispanics or Latinos* are disproportionately affected by HIV infection; the annual rate of HIV diagnosis among Hispanics or Latinos is approximately three times that of non-Hispanic whites (*3*). To achieve the goals of the National HIV/AIDS Strategy, and to be consistent with the HIV Care Continuum Initiative, Hispanics or Latinos living with HIV infection need improved levels of care and viral suppression (*4*–*6*). Achieving these goals calls for 85% of Hispanics or Latinos with diagnosed HIV to be linked to care, 80% to be retained in care, and the proportion with an undetectable viral load (VL) to increase 20% by 2015 (*1*). Analysis of data from the National HIV Surveillance System (NHSS)† and the Medical Monitoring Project (MMP)§ regarding progress along the HIV care continuum during 2010 for Hispanics or Latinos with diagnosed HIV infection indicated that 80.3% of HIV-diagnosed Hispanics or Latinos were linked to care, 54.4% were retained in care, 44.4% were prescribed antiretroviral therapy (ART), and 36.9% had achieved viral suppression (VL result of ≤200 copies/mL). Among Hispanic or Latino males and females, the percentages that were linked to care, were prescribed ART, and had achieved viral suppression were similar; however, the percentage retained in care was lower among males compared with females. The levels of linkage to care and viral suppression were lower among Hispanics or Latinos with HIV infection attributed to injection drug use than among those with HIV infection attributed to heterosexual or male-to-male sexual contact. These data demonstrate the need for implementation of interventions and public health strategies that increase linkage to care, retention in care, and consistent ART among Hispanics or Latinos, particularly Hispanics or Latinos who inject drugs.

Data from NHSS for 2010 reported to CDC through December 2012 were used to determine the numbers of Hispanics or Latinos aged ≥13 years newly diagnosed with HIV and living with diagnosed HIV and the numbers and percentages linked to care and retained in care. Nineteen jurisdictions met the criteria for the collection and reporting of CD4+ T-lymphocyte (CD4) and VL test results,¶ which are the data needed to assess linkage and retention in care. Linkage to care** was calculated among Hispanics or Latinos with new HIV diagnoses during 2010 who resided in any of the 19 jurisdictions at diagnosis. Retention in care†† was assessed among Hispanics or Latinos with HIV diagnosed by December 31, 2009, who resided in any of the 19 jurisdictions at the time of diagnosis, and were alive on December 31, 2010, (i.e., persons living with diagnosed HIV). Data were statistically adjusted for missing HIV transmission categories (*3*).

Data from MMP were used to estimate ART prescription§§ and viral suppression¶¶ among Hispanics or Latinos aged ≥18 years using methods that have been described previously (*5*). The MMP values are weighted national estimates of the numbers of Hispanics or Latinos who received medical care during

* Hispanics or Latinos can be of any race.

† NHSS is the primary source for monitoring HIV trends in the United States. The system collects, analyzes, and disseminates information about new and existing cases of HIV infection.

§ MMP is a supplemental HIV surveillance system designed to produce nationally representative estimates of the prevalence of behavioral and clinical characteristics among HIV-infected adults aged ≥18 years receiving medical care in the United States and Puerto Rico.

¶ The 19 jurisdictions were California (Los Angeles County and San Francisco only), Delaware, District of Columbia, Georgia, Hawaii, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Dakota, South Carolina, West Virginia, and Wyoming. The criteria for complete reporting were as follows: 1) the jurisdiction's laws or regulations required reporting of all CD4 and VL test results to the state or local health department, 2) ≥95% of all laboratory test results were reported by laboratories that conduct HIV-related testing for each jurisdiction, and 3) the jurisdiction reported to CDC all CD4 and VL results received since at least January 2010.

** Defined as having one or more CD4 (count or percentage) or VL test performed within 3 months after HIV diagnosis during 2010, including those performed during the same month as diagnosis.

†† Defined as having two or more CD4 or VL results at least 3 months apart during 2010, among persons diagnosed through December 31, 2009, and alive on December 31, 2010.

§§ ART prescription was based on MMP data for all Hispanic or Latino MMP participants in the 2010 data collection cycle.

¶¶ Viral suppression was based on all Hispanic or Latino MMP participants in the 2010 data collection cycle and was defined as having a VL result of ≤200 copies/mL at the most recent HIV VL in the preceding 12 months. The cut-off value of ≤200 copies/mL was based on the U.S. Department of Health and Human Services recommended definition of virologic failure.

January–April 2010 and had documentation of ART prescription and viral suppression. Percentages were calculated among Hispanics or Latinos whose HIV infection was diagnosed by December 31, 2009, and who were alive on December 31, 2010, in the United States and Puerto Rico (denominators were based on NHSS data). Data analyses were limited to 2010, the most recent year data were available for persons living with HIV infection.

Of the 2,992 Hispanics or Latinos with HIV infection diagnosed during 2010 in the 19 jurisdictions, 2,402 (80.3%) were linked to care ≤3 months after HIV diagnosis (Table 1). Among males and females, 80.2% and 80.7%, respectively, were linked to care. The percentage of linkage to care was similar across age categories, with persons aged 13–24 years having the lowest percentage linked to care (78.7%) and persons aged 45–54 years having the highest percentage linked to care (81.9%). By transmission category, the lowest percentage of linkage to care was among males and females with infection attributed to injection drug use (76.5% and 78.6%, respectively), whereas the highest percentage of linkage to care was among males and females with infection attributed to heterosexual contact (82.9% and 81.0%, respectively).

Among 70,213 Hispanics or Latinos aged ≥13 years residing in the 19 jurisdictions at HIV diagnosis and reported living at the end of 2010, 54.4% were retained in care (Table 2). Of these, males (52.7%) had a 7% lower percentage retained in care compared with females (59.7%). By age group, the percentage retained in care was similar, with persons aged 25–34 years having the lowest percentage retained in care (52.2%) and persons aged 45–54 years having the highest percentage retained in care (55.7%). By transmission category, the lowest percentage retained in care was among males with infection

TABLE 1. Linkage to HIV medical care within 3 months after HIV diagnosis* among Hispanics/Latinos aged ≥13 years, by selected characteristics — National HIV Surveillance System, 19 jurisdictions,† United States, 2010

Characteristic	No. of HIV diagnoses	Linkage to care§	
		No.	(%)
Sex			
Male	2,499	2,004	(80.2)
Female	493	398	(80.7)
Age group at diagnosis (yrs)			
13–24	583	459	(78.7)
25–34	1,031	817	(79.2)
35–44	775	633	(81.7)
45–54	420	344	(81.9)
≥55	183	149	(81.4)
Transmission category¶			
Male-to-male sexual contact	2,060	1,653	(80.3)
Injection drug use			
Male	172	132	(76.5)
Female	64	50	(78.6)
Male-to-male sexual contact and injection drug use	86	69	(79.4)
Heterosexual contact**			
Male	178	148	(82.9)
Female	428	347	(81.0)
Total††	**2,992**	**2,402**	**(80.3)**

Abbreviation: HIV = human immunodeficiency virus.
* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Hispanics/Latinos can be of any race.
† The 19 jurisdictions were California (Los Angeles County and San Francisco only), Delaware, District of Columbia, Georgia, Hawaii, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Dakota, South Carolina, West Virginia, and Wyoming.
§ One or more CD4+ T-lymphocyte or viral load test within 3 months after HIV diagnosis.
¶ Data statistically adjusted to account for missing transmission categories.
** Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
†† Includes three persons with diagnosed infection attributed to hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.

TABLE 2. Retention in HIV medical care among Hispanics/Latinos aged ≥13 years with HIV infection diagnosed by December 31, 2009,* who were alive on December 31, 2010, by selected characteristics — National HIV Surveillance System, 19 jurisdictions,† United States

Characteristic	No.	Retention in care in 2010§	
		No.	(%)
Sex			
Male	53,918	28,434	(52.7)
Female	16,295	9,735	(59.7)
Age group on December 31, 2009 (yrs)			
13–24	2,880	1,592	(55.3)
25–34	10,447	5,449	(52.2)
35–44	21,778	11,823	(54.3)
45–54	23,277	12,955	(55.7)
≥55	11,831	6,350	(53.7)
Transmission category¶			
Male-to-male sexual contact	34,254	18,515	(54.1)
Injection drug use			
Male	11,060	5,263	(47.6)
Female	4,980	2,952	(59.3)
Male-to-male sexual contact and injection drug use	3,669	2,043	(55.7)
Heterosexual contact**			
Male	4,266	2,256	(52.9)
Female	10,670	6,378	(59.8)
Other††			
Male	668	356	(53.3)
Female	645	404	(62.7)
Total	**70,213**	**38,169**	**(54.4)**

Abbreviation: HIV = human immunodeficiency virus.
* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Hispanics/Latinos can be of any race.
† The 19 jurisdictions were California (Los Angeles County and San Francisco only), Delaware, District of Columbia, Georgia, Hawaii, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Dakota, South Carolina, West Virginia, and Wyoming.
§ Two or more CD4+ T-lymphocyte or viral load tests performed at least 3 months apart during 2010.
¶ Data statistically adjusted to account for missing transmission categories.
** Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
†† Includes persons with diagnosed infection attributed to hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.

attributed to injection drug use (47.6%), and the highest percentage was among females with infection attributed to heterosexual contact (59.8%).

Of 172,536 Hispanics or Latinos aged ≥18 years living with diagnosed HIV on December 31, 2010, in the United States and Puerto Rico, 76,650 (44.4%) were prescribed ART (Table 3). Among males and females, 44.0% and 45.7%, respectively, were prescribed ART. Prevalence of ART prescription was lowest among those aged 25–34 years (36.7%) and highest among those aged ≥55 years (59.3%). The lowest percentage of ART prescription by transmission category was among males with infection attributed to injection drug use (31.0%), and the highest percentage was among females with infection attributed to heterosexual contact (49.8%).

Of Hispanics or Latinos living with diagnosed HIV in the United States and Puerto Rico, 36.9% had achieved viral suppression at their most recent test. Males and females had nearly the same percentage of viral suppression (36.9% and 37.0%, respectively). Persons aged 25–34 years had the lowest percentage of viral suppression (28.6%), and persons aged ≥55 years had the highest percentage (54.3%). By transmission category, females with infection attributed to injection drug use had the lowest percentage of viral suppression (23.4%), whereas females with infection attributed to heterosexual contact had the highest percentage (42.6%).

Discussion

The results of the analysis described in this report indicate that, in 2010, among adult and adolescent Hispanics or Latinos of all age groups and both sexes who were diagnosed with HIV, 80.3% were linked to care, 54.4% were retained in care, 44.4% were prescribed ART, and 36.9% had achieved viral suppression. Across the HIV care continuum, Hispanics or Latinos have higher percentages of linkage to and retention in care and ART prescription compared with the national population of persons with HIV, but they have a lower percentage of viral suppression compared with the same national population (*4*). Among Hispanics or Latinos, percentages of linkage to and retention in care are similar across age groups; this similarity by

TABLE 3. Prescription of antiretroviral therapy (ART) and viral suppression among Hispanics/Latinos aged ≥18 years with HIV infection diagnosed by December 31, 2009,* who were alive on December 31, 2010, by selected characteristics — National HIV Surveillance System, Medical Monitoring Project, United States and Puerto Rico

Characteristic	No.†	ART prescription§		Viral suppression¶	
		No.	(%)	No.	(%)
Sex					
Male	133,209	58,590	(44.0)	49,184	(36.9)
Female	39,327	17,963	(45.7)	14,561	(37.0)
Age group at interview (yrs)					
18–24	6,182	2,684	(43.4)	1,884	(30.5)
25–34	28,747	10,555	(36.7)	8,224	(28.6)
35–44	55,998	23,553	(42.1)	19,201	(34.3)
45–54	55,644	24,471	(44.0)	20,350	(36.6)
≥55	25,965	15,387	(59.3)	14,087	(54.3)
Transmission category**					
Male-to-male sexual contact	82,410	40,509	(49.2)	34,233	(41.5)
Injection drug use					
Male	26,545	8,241	(31.0)	7,379	(27.8)
Female	10,312	3,516	(34.1)	2,410	(23.4)
Male-to-male sexual contact and injection drug use	9,082	3,041	(33.5)	2,514	(27.7)
Heterosexual contact††					
Male	14,159	6,505	(45.9)	5,009	(35.4)
Female	28,173	14,019	(49.8)	12,014	(42.6)
Other transmission§§	1,855	819	(44.2)	186	(10.0)
Total¶¶	**172,536**	**76,650**	**(44.4)**	**63,745**	**(36.9)**

Abbreviation: HIV = human immunodeficiency virus.

* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Hispanics/Latinos can be of any race.

† National HIV Surveillance System estimates for United States and Puerto Rico.

§ Medical Monitoring Project estimates for United States and Puerto Rico for persons who received medical care during January–April 2010 and who had documentation of ART prescription in the medical record.

¶ Medical Monitoring Project estimates for United States and Puerto Rico for persons who received medical care during January–April 2010 and whose most recent HIV viral load in the preceding 12 months was undetectable or ≤200 copies/mL.

** Data statistically adjusted to account for missing transmission categories.

†† Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

§§ Includes persons with diagnosed infection attributed to hemophilia, blood transfusion, perinatal exposure, or risk factor not reported or not identified.

¶¶ Estimates might not sum to total.

age is not observed among the national population of persons with HIV or among blacks or African Americans with HIV (*4*).

Hispanics or Latinos with HIV infection might not seek, receive, or adhere to HIV care or achieve viral suppression for reasons including lack of health insurance, language barriers, geographic differences, and migration patterns (*7,8*). HIV programs that focus on care and treatment for Hispanics or Latinos might strengthen efforts to link and retain persons with HIV in care and promote adherence to medication to achieve optimal health outcomes. Evidence-based interventions with demonstrated efficacy in scientific studies and effectiveness in practice settings also might be considered (*9*).

Hispanics or Latinos with HIV infection attributed to injection drug use or male-to-male sexual contact and injection drug use typically had lower levels of linkage to care, retention in care, ART prescription, and viral suppression than those with HIV infection attributed to heterosexual or male-to-male sexual contact. In addition to interventions to ensure that all persons with HIV infection receive optimal care to improve health outcomes, targeted strategies for Hispanics or Latinos who inject drugs might be needed to achieve improvements at each step of the continuum. Providing comprehensive prevention services and referrals to persons who inject drugs, such as those offered by many syringe exchange programs, can help reduce the spread of HIV. These programs can also serve as gateways to care and treatment for HIV infection, thus serving as an effective public health approach for this population (*10*).

The findings in this report are subject to at least two limitations. First, analyses based on NHSS data are limited to 19 jurisdictions with complete reporting of all levels of CD4 and VL test results; data from these areas represent approximately 45% of all Hispanics or Latinos living with diagnosed HIV on December 31, 2010, in the United States, and might not be representative of all Hispanics or Latinos in the United States. Second, certain analyses in this study are based on different populations, and the results cannot be compared because linkage to care and retention in care were based on data for persons aged ≥13 years from 19 jurisdictions, whereas ART prescription and viral suppression were based on weighted estimates of persons receiving care who were aged ≥18 years from the United States and Puerto Rico.

CDC and its partners are pursuing a high-impact prevention*** approach to advance the goals of the National HIV/AIDS Strategy and maximize the effectiveness of current HIV prevention and care methods. Testing is a critical first step of entry into the HIV continuum of care. CDC supports HIV testing projects and campaigns that focus on Hispanics or Latinos. One such campaign is Reasons (Razones),††† which is the agency's first national effort to encourage HIV testing among Latino gay and bisexual men, who comprise the majority of Hispanics or Latinos diagnosed with HIV. CDC also supports multiple projects to optimize outcomes along the continuum of care, such as the HIV Screening. Standard Care.Testing and Linking African American and Hispanic/Latino Patients to Care.§§§ campaign, which is a new segment of the Act Against AIDS campaign tailored to help health care providers improve HIV outcomes among African American and Hispanic or Latino patients by making HIV testing and linking to care the clinical standard. Another project is the Care and Prevention in the United States¶¶¶ demonstration project, which seeks to increase linkage to, retention in, and reengagement in care for all persons with HIV, including racial and ethnic minorities, with the goal of reducing HIV-related morbidity and mortality by addressing social, economic, clinical,

What is already known on this topic?

The 2010 annual rate of human immunodeficiency virus (HIV) diagnosis among Hispanics or Latinos was approximately three times that of non-Hispanic whites. The percentages of Hispanics or Latinos linked to care, retained in care, taking antiretroviral medications, and achieving viral suppression have been lower than those for whites but higher than for blacks or African Americans.

What is added by this report?

Data from 2010 indicate that 80.3% of HIV-infected Hispanics or Latinos were linked to care, 54.4% were retained in care, 44.4% were prescribed antiretroviral therapy (ART), and 36.9% had achieved viral suppression. Among Hispanic or Latino males and females, the percentages that were linked to care, were prescribed ART, and had achieved viral suppression were similar; however, the percentage retained in care was lower among males compared with females. The levels of linkage to care and viral suppression were lower among Hispanics or Latinos with HIV infection attributed to injection drug use than among those with HIV infection attributed to heterosexual or male-to-male sexual contact.

What are the implications for public health practice?

Increasing the proportion of Hispanics or Latinos living with HIV who are receiving care is critical for achieving the goals of the National HIV/AIDS Strategy to reduce new infections, improve health outcomes, and decrease health disparities. Among Hispanics or Latinos, targeted strategies for different groups, such as persons who inject drugs, might be needed to achieve improvements at each step of the HIV care continuum.

*** Additional information available at http://www.cdc.gov/nchhstp/newsroom/hivfactsheets/future/high-impact-prevention.htm.

††† Additional information available at http://hivtest.cdc.gov/reasons.

§§§ Additional information available at http://www.cdc.gov/actagainstaids/campaigns/hssc/index.html.

¶¶¶ Additional information available at http://www.cdc.gov/hiv/prevention/demonstration/capus.

and structural factors influencing HIV health outcomes. The results of the analyses described in this report underscore the need for enhanced linkage to care, retention in care, and viral suppression for Hispanics or Latinos. Focusing prevention and care efforts on populations that bear a disproportionate burden of HIV disease could lead to reductions in HIV incidence and health inequities and help achieve the goals of the National HIV/AIDS Strategy.

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Assessment of Ebola Virus Disease, Health Care Infrastructure, and Preparedness — Four Counties, Southeastern Liberia, August 2014

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On October 7, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Ebola virus disease (Ebola) is a multisystem disease caused by a virus of the genus Ebolavirus (*1,2*). In late March 2014, Ebola cases were described in Liberia, with epicenters in Lofa County and later in Montserrado County (*3*). While information about case burden and health care infrastructure was available for the two epicenters, little information was available about remote counties in southeastern Liberia (Figure 1). Over 9 days, August 6–14, 2014, Ebola case burden, health care infrastructure, and emergency preparedness were assessed in collaboration with the Liberian Ministry of Health and Social Welfare in four counties in southeastern Liberia: Grand Gedeh, Grand Kru, River Gee, and Maryland. Data were collected by health care facility visits to three of the four county referral hospitals and by unstructured interviews with county and district health officials, hospital administrators, physicians, nurses, physician assistants, and health educators in all four counties. Local burial practices were discussed with county officials, but no direct observation of burial practices was conducted. Basic information about Ebola surveillance and epidemiology, case investigation, contact tracing, case management, and infection control was provided to local officials.

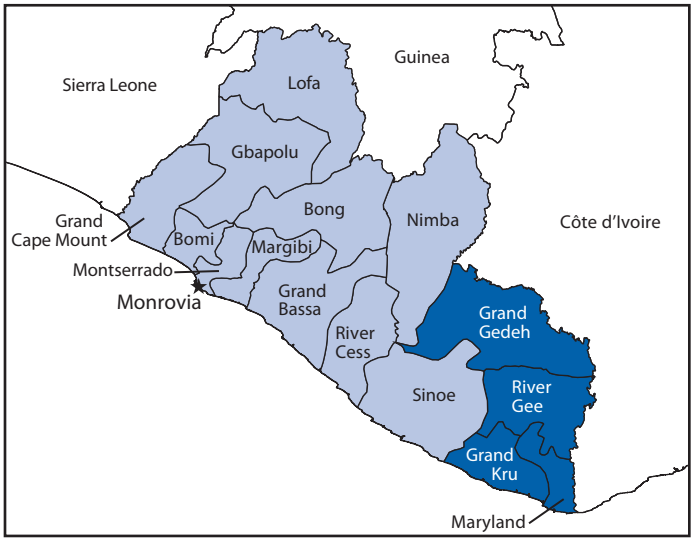
At the time of the evaluation, no cases of Ebola infection had been reported from any of the four counties. Each county has one referral hospital (100–150 beds) with outlying health centers and 17–24 clinics. Before the epidemic, six physicians served all four counties (range = one to three per county). At the time of the evaluation, only three physicians remained; the others had left Liberia because of the epidemic. In two of four hospitals assessed, nursing staff members were not coming to work or had abandoned facilities; in another hospital, health care providers had not been paid for 3 months but were still providing basic care. Frequently, nursing students, nursing aides, and community health care volunteers were providing basic medical care and responding to obstetric and surgical emergencies.

Supplies of nonsterile gloves and sterile obstetric and surgical gloves were depleted or absent in all four counties. Hand washing stations rarely were available in the facilities assessed, and if available, were typically located only in operating theaters. Hand washing stations in most health care settings consisted of water jugs, and even these were scarce. To compensate, bamboo hand washing stations were constructed for use at entrances to hospitals, county checkpoints, and in towns (Figure 2). Supplies of soap, bleach, or alcohol-based hand gel also were depleted. Rudimentary isolation facilities were present in two counties; neither had water, electricity, or waste disposal facilities. Communication between the county health office and hospitals and clinics relied on cell phones and radios, with intermittent Internet availability. In one county, only six of 19 health facilities had radio or cell phone contact with the health office; the other 13 required site visits by a district health officer. Transportation of specimens and patients was challenging; the counties each had only one functioning ambulance for all medical or specimen transfer, and no air transport was available.

Ebola emergency preparedness plans at the county and hospital level were lacking. Although Ebola task forces had been established in each county, according to reports from the field, the infrastructure and leadership were hampered by limited resources and difficulty communicating with and mobilizing the local communities. In all counties, there was insufficient personal protective equipment to care for patients with Ebola. Health care providers had not received training on the donning and removal of personal protective equipment. No training on case investigation, case management, contact tracing, or safe burial practices had been provided at either the county or hospital level. No Ebola surveillance systems were in place.

After basic training on case definitions and surveillance was provided to local officials, River Gee County health officials reviewed recent deaths and identified a patient with suspected Ebola. On August 3, a pregnant woman (patient 1) died during a spontaneous abortion after leaving Monrovia where she had contact with an infected person at a funeral; she was buried by the community in the week after her death. On August 24, 2014, Maryland County authorities identified a man hiding in a rice truck who had signs and symptoms of Ebola (patient 2). The truck had departed from Fish Town, River Gee County, and was destined for Pleebo, Maryland County. The man, who was reported to have participated in the burial of patient 1, was sent back to Fish Town, where he later was reported to have

FIGURE 1. Location of the four counties assessed for Ebola virus disease case burden, health care infrastructure, and preparedness — Liberia, August 2014



died of laboratory-confirmed Ebola. This was the first evidence of secondary transmission of Ebola in southeast Liberia.

Although additional Ebola cases have been reported in southeastern Liberia since this assessment was completed, there have been improvements in the level of Ebola preparedness. County health care staff received multiple trainings on surveillance, infection prevention and control practices, and burial practices. County Ebola task force meetings take place regularly, and an Ebola incident management system is in place. Additional ambulances and pickup trucks have been provided to county health teams. Three Ebola treatment units and multiple community care centers are planned for these southeastern counties. Still, obstacles to preventing spread of Ebola remain, and personal protective equipment,* sufficient personnel for effective contact tracing and case management,† efficient patient transport, and regional diagnostic laboratory capabilities are urgently needed. The Ebola disease case burden in southeastern Liberia is still lower than other areas of Liberia, but additional public health actions to strengthen preparedness and response efforts are needed to prevent further disease spread.

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

* Additional information available at http://www.cdc.gov/hai/prevent/ppe.html.
† Additional information available at http://www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html.

FIGURE 2. Residents use one of the bamboo hand washing stations* that were erected to improve health care practices at entrances to hospitals, county checkpoints, and in towns — Liberia, August 2014

* The diaphragms in the upper part of the bamboo stem are perforated to create a tube that can be filled with water. A hole is drilled just above the lowest intact diaphragm, then plugged with a small stick. The plug is removed to produce a stream of water.

Acknowledgments

Liberian Ministry of Health and Social Welfare. Embassy of the United States, Monrovia, Liberia. Members of the CDC Liberian Field Team.

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Vital Signs: Health Burden and Medical Costs of Nonfatal Injuries to Motor Vehicle Occupants — United States, 2012

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On October 7, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Abstract

Background: Motor vehicle crashes are a leading cause of death and injury in the United States. The purpose of this study was to describe the current health burden and medical and work loss costs of nonfatal crash injuries among vehicle occupants in the United States.

Methods: CDC analyzed data on emergency department (ED) visits resulting from nonfatal crash injuries among vehicle occupants in 2012 using the National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP) and the Healthcare Cost and Utilization Project National Inpatient Sample (HCUP-NIS). The number and rate of all ED visits for the treatment of crash injuries that resulted in the patient being released and the number and rate of hospitalizations for the treatment of crash injuries were estimated, as were the associated number of hospital days and lifetime medical and work loss costs.

Results: In 2012, an estimated 2,519,471 ED visits resulted from nonfatal crash injuries, with an estimated lifetime medical cost of $18.4 billion (2012 U.S. dollars). Approximately 7.5% of these visits resulted in hospitalizations that required an estimated 1,057,465 hospital days in 2012.

Conclusions: Nonfatal crash injuries occur frequently and result in substantial costs to individuals, employers, and society. For each motor vehicle crash death in 2012, eight persons were hospitalized, and 100 were treated and released from the ED.

Implications for Public Health: Public health practices and laws, such as primary seat belt laws, child passenger restraint laws, ignition interlocks to prevent alcohol impaired driving, sobriety checkpoints, and graduated driver licensing systems have demonstrated effectiveness for reducing motor vehicle crashes and injuries. They might also substantially reduce associated ED visits, hospitalizations, and medical costs.

Introduction

Motor vehicle crashes are a leading cause of injury and death. Previous research has shown that motor vehicle crashes result in substantial mortality, with 22,912 motor vehicle occupants killed in 2012 in the United States (*1*), and an estimated 265,000 years of potential life lost in 2011 (CDC's Web-Based Injury Statistics Query and Reporting System [WISQARS], unpublished data, 2014). The estimated medical cost of such fatalities was $226 million (*2*). Because the burden of nonfatal injuries caused by motor vehicle crashes has been less well-documented, this report estimates the U.S. health burden and medical and work loss costs of nonfatal motor vehicle crash injuries; the most recent available data on emergency department (ED) visits and hospitalizations were examined.

Methods

Data from the 2012 National Electronic Injury Surveillance System – All Injury Program (NEISS-AIP), which is operated by the U.S. Consumer Product Safety Commission in collaboration with CDC, and data from the 2012 Healthcare Cost and Utilization Project National Inpatient Sample (HCUP-NIS) of the U.S. Agency for Healthcare Research and Quality were analyzed. NEISS-AIP is a nationally representative stratified probability sample of 63 U.S. hospitals (*3*). Detailed data on initial ED visits per injury per person are abstracted from medical records for all nonfatal injuries and poisonings. Patients who made more than one ED visit because of a crash injury in 2012 were counted separately for each visit. NEISS-AIP data are publicly available through CDC's WISQARS (*2*). HCUP-NIS is based on a 20% stratified sample of inpatient hospital

discharges at U.S. community hospitals. In 2012, 44 states participated in HCUP-NIS, and resulting data were weighted to provide national estimates (*4*). Data on work-related crash injuries were obtained from the NEISS-Work occupational supplement, which uses the same sample as NEISS-AIP. In all data sources, nonfatal occupant (driver or passenger) injuries from unintentional motor vehicle traffic crashes (hereafter called crash injuries) were defined consistent with the *International Classification of Diseases, Ninth Revision, Clinical Modification* external cause-of-injury codes E810–E819 with suffixes ".0" and ".1" (indicating injuries specific to motor vehicle occupants). Nature of injury categories (e.g., sprains/strains and fractures) were derived from the NEISS-AIP principal diagnosis codes. Rates of ED visits were calculated for all crash injuries using population estimates from the U.S. Bureau of the Census (http://www.census.gov/population/projections/data/national/2012.html), and for work-related crash injuries using estimates of full-time-equivalent (FTE) employees from the U.S. Bureau of Labor Statistics' Current Population Survey (http://www.census.gov/cps/methodology).

Estimated counts, rates per 100,000 population, and 95% confidence intervals (CIs) for total, treated and released, and transferred or hospitalized (hereafter referred to as hospitalized) ED patients and the proportion of hospitalized ED patients were stratified by sex and age group. The age groups, selected to coincide with distinct crash risk and opportunities for intervention, were: 0–14 years, 15–29 years (further divided into 15–17 years, 18–20 years, 21–24 years, and 25–29 years), 30–39 years, 40–49 years, 50–59 years, 60–69 years, 70–79 years, and ≥80 years. Crude injury rates were presented for each age group, whereas overall and sex-specific injury rates were age-adjusted to the standard year 2000 population (*2*). For work-related crash injuries, the age group of 20–69 years was used to coincide with the ages of those most likely to drive for work. Differences in estimates were considered statistically significant ($p \leq 0.05$) if their CIs did not overlap. The proportion of ED visits by nature of injury were calculated using 2010 data (the most recent data available). The annual estimated total number of hospital days was calculated by multiplying the total number of ED visits resulting in hospitalization from NEISS-AIP by the average length of stay from HCUP-NIS .

Methods for estimating lifetime medical and loss of work costs associated with crash injuries are described in detail elsewhere (*5*). The medical estimates included the cost of initial ED visits and hospitalizations for crash injuries, attributable lifetime medical costs (e.g., follow-up ED visits and hospitalizations, ambulance transportation, ambulatory care, prescription drugs, home health care, vision aids, dental visits, and medical devices), and nursing home and insurance claims administration costs. The loss of work estimates included lost expected employment earnings, lost fringe benefits, and lost value of household work. Costs beyond the first year after the crash injury were discounted at the recommended 3% (*6*). Medical costs were estimated from 2010 U.S. dollars (USD) data and inflated to 2012 USD using the Price Indexes for Personal Consumption Expenditures by Function from the U.S. Bureau of Economic Analysis (*5*). Work loss estimates are presented as 2012 USD based on the Employment Cost Index, Total Compensation, Civilian from the U.S. Bureau of Labor Statistics for productivity loss (*5*). Total lifetime medical costs were calculated by multiplying the number of treated and released ED patients or hospitalized patients by the corresponding average estimated lifetime medical cost for both sexes and each age group and summing the results.

Results

During 2012, an estimated 2,519,471 ED visits (CI = 2,041,225–2,997,717) for crash injuries occurred, corresponding to an estimated rate of 806 visits per 100,000 population (Table 1). Of these visits, 1%–2% were identified as work-related, with a rate of 25 visits per 100,000 FTE employees. Age-specific rates by disposition did not vary significantly by sex. Total visit rates varied significantly by age; children aged 0–14 years had the lowest rate (281 visits per 100,000 population [CI = 218–344]), teens and young adults aged 15–29 years the highest rate (1,448 visits per 100,000 population [CI = 1,165–1,742]), and adults aged 30–39 years the second highest rate (1,075 visits per 100,000 population [CI = 883–1,267]) (Table 1). Rates for work-related crashes did not vary significantly by age group, ranging from 23 to 29 visits per 100,000 FTE employees aged 20–69 years.

Approximately 7.5% (N = 188,833 [CI = 110,377–267,288]) of persons visiting EDs because of crash injuries were hospitalized. A similar proportion of persons with work-related crash injuries (8%) were hospitalized. Adults aged ≥80 years had a significantly higher hospitalization rate (33%) than other age groups except for adults aged 70–79 years (17%) (Figure 1). The average length of stay for hospitalization among all ages was 5.6 days for a total of 1,057,465 hospital days. Sprains/ strains accounted for 55% of treated and released ED visits (Figure 2), although such injuries were the least likely to result in hospitalization, with 99.6% of patients with sprains/strains treated and released. Fractures accounted for just 4% of treated and released ED visits but resulted in hospitalization in 45% of cases.

The lifetime medical cost of crash injuries was estimated to be $18.4 billion: $7.7 billion for treated and released patients and $10.7 billion for hospitalized patients (Table 2). The average lifetime medical cost per hospitalized patient was $56,674 (Table 2). The average lifetime medical cost per treated and released patient was $3,362 (Table 2). The

TABLE 1. Number and rate* of emergency department visits for nonfatal crash injuries among motor vehicle occupants, by age group, sex, and disposition — National Electronic Injury Surveillance System, United States, 2012

Age group and sex	Total†			Treated and released			Hospitalized		
	No. of visits§¶	No. per 100,000	(95% CI)	No. of visits§¶	No. per 100,000	(95% CI)	No. of visits§¶	No. per 100,000	(95% CI)
0–14 yrs									
Total	171,954	281.2**	(218.1–344.4)	160,810	263.0	(203.5–322.5)	8,315	13.6	(7.2–20.0)
Female	94,152	314.9	(244.0–385.8)	88,790	296.9	(228.8–365.1)	4,241	14.2	(8.0–20.4)
Male	77,802	249.0	(191.8–306.3)	72,020	230.5	(178.0–283.0)	4,074	13.0	(5.9–20.2)
15–29 yrs									
Total	949,524	1,447.6**	(1,164.7–1,741.6)	877,366	1,342.7	(1,074.5–1,611.0)	60,737	93.0	(49.5–136.4)
Female	535,478	1,669.0	(1,330.7–2,017.6)	504,770	1,578.1	(1,250.4–1,905.9)	25,042	78.6	(41.2–115.4)
Male	414,022	1,235.5	(999.4–1,482.9)	372,572	1,116.9	(900.0–1,333.9)	35,696	107.0	(56.9–157.1)
15–17 yrs									
Total	124,977	993.1	(772.1–1,214.2)	114,047	906.3	(703.9–1,108.7)	9,408	74.8	(36.0–113.5)
Female	72,566	812.9	(917.5–1,447.4)	67,818	1,105.1	(856.0–1,354.2)	3,740	60.9	(27.0–94.8)
Male	52,411	812.9	(624.5–1,001.4)	46,229	717.0	(549.7–884.4)	5,668	87.9	(42.6–133.2)
18–20 yrs									
Total	239,563	1,798.0	(1,395.4–2,201.5)	219,644	1,648.9	(1,287.5–2,010.4)	17,106	128.4	(62.6–194.3)
Female	134,161	2,074.0	(1,608.6–2,538.8)	125,761	1,943.8	(1,511.6–2,376.1)	7,055	109.0	(47.3–170.8)
Male	105,402	1,539.0	(1,181.4–1,895.6)	93,883	1,370.4	(1,060.3–1,680.5)	10,051	146.7	(73.8–219.7)
21–24 yrs									
Total	292,060	1,619.0	(1,288.0–1,950.0)	269,885	1,496.1	(1,186.3–1,805.9)	18,074	100.2	(53.2–147.2)
Female	166,130	1,882.5	(1,453.3–2,311.7)	156,774	1,776.5	(1,368.5–2,184.4)	7,690	87.1	(43.5–130.8)
Male	125,905	1,366.4	(1,114.8–1,618.0)	113,087	1,227.3	(997.8–1,456.8)	10,384	112.7	(60.2–165.2)
25–29 yrs									
Total	292,925	1,368.9	(1,096.6–1,641.3)	273,790	1,279.5	(1,016.9–1,542.1)	16,150	75.5	(40.3–110.6)
Female	162,620	1,540.9	(1,231.6–1,850.2)	154,417	1,463.2	(1,160.0–1,766.4)	6,558	62.1	(34.9–89.4)
Male	130,304	1,201.5	(955.7–1,447.3)	119,373	1,100.7	(869.0–1,332.5)	9,592	88.5	(43.6–133.3)
30–39 yrs									
Total	434,428	1,075.3	(883.3–1,267.3)	407,260	1,008.1	(817.7–1,198.5)	23,556	58.3	(33.9–82.7)
Female	242,240	1,199.8	(986.4–1,413.1)	229,945	1,138.9	(926.2–1,351.5)	10,169	50.4	(30.5–70.2)
Male	192,188	951.0	(766.5–1,135.6)	177,315	877.4	(696.1–1,058.8)	13,387	66.2	(36.1–96.4)
40–49 yrs									
Total	368,556	862.8	(683.9–1,041.6)	341,140	798.6	(621.0–976.2)	23,608	55.3	(31.1–79.5)
Female	202,933	942.5	(748.1–1,136.8)	192,064	892.0	(697.5–1,086.5)	9,628	44.7	(22.2–67.2)
Male	165,624	781.8	(612.4–951.2)	149,076	703.7	(538.3–869.0)	13,980	66.0	(38.9–93.0)
50–59 yrs									
Total	304,965	703.0	(576.0–831.0)	275,930	636.5	(514.1–758.9)	25,548	58.9	(37.0–80.9)
Female	169,333	763.0	(619.9–905.4)	156,938	706.8	(569.1–844.6)	10,839	48.8	(30.4–67.2)
Male	135,631	641.0	(522.1–760.5)	118,992	562.6	(449.2–676.1)	14,710	69.6	(42.5–96.6)
60–69 yrs									
Total	167,330	526.3	(414.1–638.6)	146,687	461.4	(364.4–558.4)	18,813	59.2	(35.2–83.2)
Female	95,216	571.9	(448.6–695.2)	85,188	511.6	(398.8–624.5)	9,170	55.1	(34.7–75.4)
Male	72,114	476.3	(372.6–580.0)	61,499	406.2	(324.3–488.0)	9,644	63.7	(34.0–93.4)
70–79 yrs									
Total	78,389	448.0	(351.0–545.0)	63,970	365.6	(292.5–438.7)	13,515	77.2	(46.4–108.0)
Female	46,286	481.6	(366.2–597.1)	37,865	394.0	(305.7–482.3)	7,900	82.2	(50.5–113.9)
Male	32,103	407.0	(321.4–492.7)	26,105	331.0	(266.9–395.1)	5,615	71.2	(37.8–104.6)
≥80 yrs									
Total	44,223	378.9	(267.7–490.1)	29,035	248.8	(183.1–314.5)	14,648	125.5	(68.0–183.0)
Female	26,509	360.7	(261.2–460.2)	17,562	239.0	(174.1–303.8)	8,783	119.5	(66.2–172.8)
Male	17,714	410.0	(268.8–551.1)	11,473	265.5	(186.7–344.4)	5,866	135.8	(65.3–206.2)
All ages††									
Total	2,519,471	806.3	(757.7–854.9)	2,302,207	738.5	(692.2–784.7)	188,833	58.8	(51.5–66.1)
Female	1,412,180	901.5	(844.9–958.2)	1,313,130	841.2	(786.6–895.9)	85,794	51.9	(45.3–58.5)
Male	1,107,268	712.7	(669.3–756.2)	989,053	637.1	(596.6–677.6)	103,039	65.9	(57.3–74.5)

Abbreviation: CI = confidence interval.

* Per 100,000 population.

† Total estimates include patients with disposition coded as "observed," "left against medical advice," or "unknown."

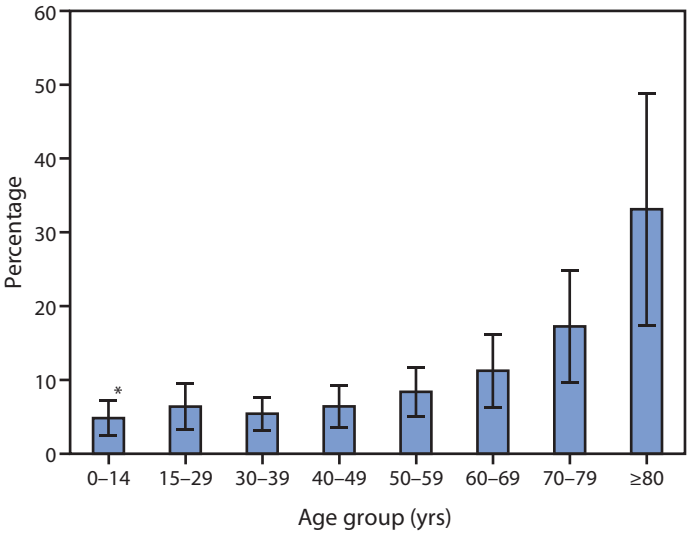
§ National estimates based on weighted data from the National Electronic Injury Surveillance System – All Injury Program.

¶ Totals include visits with unknown age and/or unknown sex. Estimates might not add up to total because of rounding.

** Rate is significantly different compared with other age groups within the same disposition category.

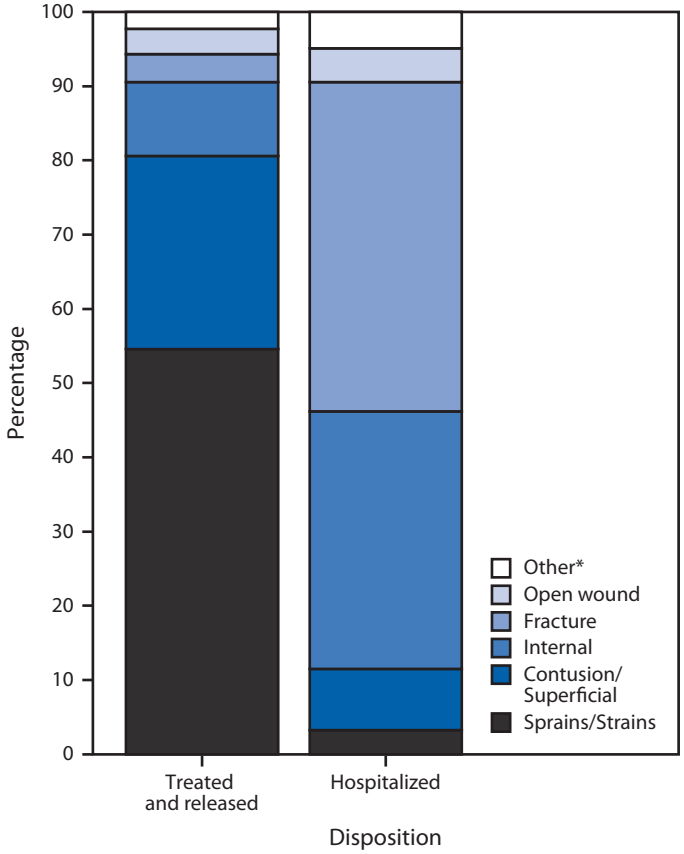
†† Estimates for all ages are age-adjusted.

FIGURE 1. Percentage of emergency department visits for nonfatal crash injuries among motor vehicle occupants that result in hospitalization, by age group — National Electronic Injury Surveillance System, United States, 2012



* 95% confidence interval.

FIGURE 2. Percentage of emergency department visits for the top five nonfatal crash injuries among motor vehicle occupants, by nature of injury and disposition — National Electronic Injury Surveillance System, United States, 2010



* Estimates based on ≤20 injury cases or a national (weighted) estimate of ≤1,200 cases might be unstable.

lifetime cost of work loss because of crash injuries in 2012 was estimated to be $32.9 billion: $9.4 billion for treated and released patients, and $23.5 billion for hospitalized patients. Crash injuries declined in the past decade. Compared with 2002, an estimated 397,761 fewer ED visits and 5,771 fewer hospitalizations occurred in 2012. This reduction was associated with an averted $1.7 billion lifetime medical cost and $2.3 billion work loss costs.

Conclusions and Comment

The health burden and medical costs resulting from nonfatal crash injuries in the United States are substantial. In 2012, an estimated 2.5 million ED visits occurred because of such injuries, of which approximately 188,000 were serious enough to require hospitalization. This is equivalent to 6,902 ED visits and 517 hospitalizations every day. With U.S. households averaging 5.7 vehicle trips per day, the risk for these injuries is widespread (*7*).

Motor vehicle crashes result in substantial mortality and years of potential life lost. This study shows that the nonfatal injury burden is also high. For each motor vehicle occupant killed in a crash in 2012, eight were hospitalized, and 100 were treated and released from the ED. The estimated lifetime medical cost of nonfatal crash injuries is similar to other serious, but perhaps more well-known, public health problems. For example, the estimated lifetime medical cost of crash injuries is approximately 50% higher than the estimated $12.6 billion cost for human immunodeficiency virus (HIV) in the United States (*8*). On average, each crash-related ED visit costs $3,362, and each hospitalization costs $56,674. These nonfatal crash injury costs can create both an immediate and lifelong burden for individuals and their families, as well as employers, and public and private health care payers. Although these are lifetime medical costs, the majority of medical costs (approximately 75%–90%) are estimated to occur in the first 18 months after the crash (*5*). In addition to the burden of medical costs, crash injuries cause a substantial lost lifetime productivity valued at $32.9 billion.

Teens and young adults aged 15–29 years accounted for a disproportionate share of the burden, comprising 21% of the population but accounting for 38% of both the treated and released visits and costs in this analysis. Other studies have shown that this age group has a higher prevalence of risk factors for crash injuries. In 2012, teens and young adults aged 16–24 years had the lowest prevalence of observed restraint use (80%) compared with all other age groups (87%–88%) (*9*). In 2010, adults aged 21–24 years and 25–34 years had the highest self-reported prevalence of driving after having had

TABLE 2. Average and total costs* of emergency department visits for nonfatal crash injuries among motor vehicle occupants, by age group, sex, and disposition — National Electronic Injury Surveillance System, United States, 2012

	Treated and released			Hospitalized		
Age group and sex	No. of visits†§	Average cost ($)	Total cost ($)	No. of visits†§	Average cost ($)	Total cost ($)
0–14 yrs						
Total	160,810	3,370	541,913,000	8,315	63,738	529,983,000
Female	88,790	3,472	308,311,000	4,241	61,929	262,641,000
Male	72,020	3,244	233,602,000	4,074	65,622	267,342,000
15–29 yrs						
Total	877,366	3,386	2,971,125,000	60,737	58,220	3,536,130,000
Female	504,770	3,278	1,654,612,000	25,042	48,815	1,222,416,000
Male	372,572	3,534	1,316,513,000	35,696	64,817	2,313,714,000
30–39 yrs						
Total	407,260	3,239	1,319,055,000	23,556	56,703	1,335,693,000
Female	229,945	3,020	694,399,000	10,169	51,096	519,593,000
Male	177,315	3,523	624,656,000	13,387	60,962	816,100,000
40–49 yrs						
Total	341,140	3,311	1,129,637,000	23,608	53,405	1,260,796,000
Female	192,064	3,106	596,617,000	9,628	53,063	510,886,000
Male	149,076	3,575	533,020,000	13,980	53,642	749,910,000
50–59 yrs						
Total	275,930	3,315	914,703,000	25,548	53,638	1,370,351,000
Female	156,938	3,178	498,816,000	10,839	51,806	561,529,000
Male	118,992	3,495	415,887,000	14,710	54,984	808,822,000
60–69 yrs						
Total	146,687	3,507	514,419,000	18,813	55,378	1,041,821,000
Female	85,188	3,593	306,085,000	9,170	48,115	441,218,000
Male	61,499	3,388	208,334,000	9,644	62,277	600,603,000
70–79 yrs						
Total	63,970	3,783	241,970,000	13,515	59,011	797,531,000
Female	37,865	3,866	146,392,000	7,900	53,432	422,114,000
Male	26,105	3,661	95,578,000	5,615	66,860	375,417,000
≥80 yrs						
Total	29,035	3,679	106,829,000	14,648	56,103	821,795,000
Female	17,562	3,754	65,924,000	8,783	52,191	458,391,000
Male	11,473	3,565	40,905,000	5,866	61,951	363,404,000
All ages						
Total	2,302,207	3,362	7,739,677,000	188,833	56,674	10,701,947,000
Female	1,313,130	3,253	4,271,182,000	85,794	51,279	4,399,393,000
Male	989,053	3,507	3,468,495,000	103,039	61,167	6,302,554,000

* Costs are in 2012 U.S. dollars.
† National estimates based on weighted data from the National Electronic Injury Surveillance System – All Injury Program.
§ Totals include visits with unknown age and/or unknown sex. Estimates might not add up to total because of rounding.

too much to drink (3.6% and 2.6%, respectively) compared with adults aged 18–20 years (2.2%) and adults aged ≥35 years (0.8%–1.9%) (*10*).

Older adults in this study were more likely to be hospitalized for a crash injury compared with other age groups. Increased frailty, rather than increased risk for crash involvement, likely accounts for the majority of increased fatality risks for adults aged ≥60 years (*11*), and might explain the increased proportion of ED visits that result in hospitalization among this age group.

Analyses of risk factors such as nonuse of restraints, alcohol use, and geographic location were not possible in this study. Although the Fatality Analysis Reporting System (derived from police reports) has national and state-level information on motor vehicle crash fatalities, including factors contributing to the crash, no single data source exists for risk factors and associated medical outcomes for nonfatal crash injuries. Also, the completeness of external cause-of-injury coding in existing state-based hospital discharge and ED data systems varies, making it difficult to monitor and assess motor vehicle crash injuries treated in hospitals in some state and local jurisdictions (*12,13*).

The findings in this report are subject to at least four limitations. First, NEISS-AIP and HCUP-NIS use different data collection methods and thus report different estimates of the number of crash injuries. NEISS-AIP data were used to present national estimates of crash injury rates because this system focuses on injury-related visits to EDs, where most crash injuries are initially treated. Second, work-related crashes might not have been identified consistently and could be undercounted.

Key Points

- In 2012, an estimated 2,519,471 emergency department visits resulting from nonfatal crash injuries occurred in the United States, with 7.5% of these visits resulting in hospitalization, accounting for an estimated 1,057,465 hospitalization days in 2012.
- The estimated total lifetime medical cost of nonfatal crash injuries was $18.4 billion (in 2012 dollars), consisting of $7.7 billion among patients treated and released from the emergency department and $10.7 billion among hospitalized patients.
- Teens and young adults aged 15–29 years account for 21% of the population but accounted for 38% of the costs for patients treated and released for crash injuries.
- Primary seatbelt laws, child passenger restraint laws, ignition interlocks to prevent alcohol impaired driving, publicized sobriety checkpoints, and graduated driver licensing systems for teens all have shown effectiveness to reduce crash injuries and fatalities. To date, no state has implemented all of these safety measures in accordance with evidence and expert recommendation.
- Additional information is available at http://www.cdc.gov/vitalsigns.

Third, the lifetime medical cost estimates presented in this report did not include medical costs among patients that left against medical advice or were kept for observation without hospital admission; however, only 1% of the NEISS-AIP sample fell into this category. Finally, the cost estimates represent less than the full identifiable economic burden because this report does not include costs such as property damage.

This analysis suggests that states, employers, and individuals can avert substantial medical costs by adopting safety practices and policies shown to protect motor vehicle occupants. Primary seatbelt laws, child passenger restraint laws, ignition interlocks to prevent alcohol impaired driving, publicized sobriety checkpoints, and graduated driver licensing systems for teens all have demonstrated effectiveness to reduce crash injuries and fatalities (*14*–*18*). These interventions reduce injuries and result in economic savings. For instance, an estimated 54,000 serious injuries could be prevented annually if all occupants wore seatbelts, and 82,000 serious injuries could be prevented if all drivers had a blood alcohol content of <0.08 g/dL (*19*). The 2009 passage of a primary seat belt law in Minnesota is estimated to have increased seat belt use and averted $45 million in hospital charges, or roughly an estimated $36 million in hospital costs (Healthcare Cost and Utilization Project, unpublished data, 2010) over a 2-year period (*20*). The presence of graduated driver licensing laws is associated with reduced injuries and reduced cost for private and public payers (*14*). A $30 booster seat is estimated to save an average of $245 in medical costs over 4 years of use (*21*). Finally, publicized sobriety checkpoint programs show benefit-cost ratios ranging from 2:1 to 57:1 (*15*). To date no state has implemented all of these safety measures in accordance with evidence and expert recommendation (*22*).

Nonfatal crash injuries occur frequently, resulting in substantial costs to individuals, families, employers, and society. In recognition of the impact of these injuries, the Moving Ahead for Progress in the 21st Century Act (*23*) requires states to monitor serious crash injuries, in addition to fatalities, to receive full highway funding. Comprehensive data on nonfatal crash injuries will improve the ability of government, employers, and health and traffic safety organizations to understand and prevent motor vehicle crash injuries. Ultimately, full implementation of effective interventions will reduce the health and cost burden from crash injuries.

Acknowledgments

Lee Annest, PhD, Division of Analysis, Research, and Practice Integration, National Center for Injury Prevention and Control, CDC. Michele Huitric, MPH, Division of Unintentional Injury Prevention, National Center for Injury Prevention and Control, CDC. Ted Miller, PhD, Pacific Institute for Research and Evaluation. Larry Blincoe, National Highway Traffic Safety Administration. Stephanie Pratt, PhD, Audrey Reichard, MPH, Division of Safety Research, National Institute for Occupational Safety and Health, CDC.

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Acute Neurologic Illness of Unknown Etiology in Children — Colorado, August–September 2014

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On October 3, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

On September 12, 2014, CDC was notified by the Colorado Department of Public Health and Environment of a cluster of nine children evaluated at Children's Hospital Colorado with acute neurologic illness characterized by extremity weakness, cranial nerve dysfunction (e.g., diplopia, facial droop, dysphagia, or dysarthria), or both. Neurologic illness onsets occurred during August 8–September 15, 2014. The median age of the children was 8 years (range = 1–18 years). Other than neck, back, or extremity pain in some patients, all had normal sensation. All had a preceding febrile illness, most with upper respiratory symptoms, occurring 3–16 days (median = 7 days) before onset of neurologic illness. Seven of eight patients with magnetic resonance imaging of the spinal cord had nonenhancing lesions of the gray matter of the spinal cord spanning multiple levels, and seven of nine with magnetic resonance imaging of the brain had nonenhancing brainstem lesions (most commonly the dorsal pons). Two of five with magnetic resonance imaging of the lumbosacral region had gadolinium enhancement of the ventral nerve roots of the cauda equina. Eight children were up to date on polio vaccination. Eight have not yet fully recovered neurologically.

Eight patients demonstrated a mild to moderate cerebrospinal fluid (CSF) pleocytosis (>5 white blood cells/μL), predominantly lymphocytic, consistent with an inflammatory or infectious process. CSF glucose was normal; CSF protein was normal or mildly elevated. Initial testing of CSF from eight patients showed no evidence of West Nile virus antibodies, although further testing is pending. CSF testing for enteroviruses, including enterovirus D68 (EV-D68), enterovirus 71, and poliovirus, by reverse transcription–polymerase chain reaction (RT-PCR) was negative in all patients. Other CSF tests for infectious causes were unrevealing.

Initial nasopharyngeal specimens were available for eight children.Six were positive for rhinovirus/enterovirus by RT-PCR. These six positive nasopharyngeal specimens were subsequently typed: four were identified as EV-D68, one as rhinovirus A24, and one was not EV-D68 but has not been typed further.The specimen positive for rhinovirus A24 also was positive for adenovirus by RT-PCR. Single rectal swabs or stool samples from eight patients were negative for enterovirus (including poliovirus) by RT-PCR.

This cluster of acute neurologic illnesses occurred against a backdrop of detection of EV-D68 causing severe respiratory disease in many parts of the United States, including Colorado (*1,2*). There are two case reports in the literature of EV-D68 causing neurologic illness (acute flaccid paralysis and encephalomyelitis) as evidenced by detection of EV-D68 in the CSF (*3,4*). However, given the current suspected widespread circulation of EV-D68 respiratory infections in Colorado, and the antecedent respiratory illness in most of these children, the detection of EV-D68 in nonsterile upper respiratory tract specimens in those with neurologic illness might be coincidental. Epidemiologic and laboratory investigations of these cases are ongoing.

On September 19, the Colorado Department of Public Health and Environment issued a Health Alert informing Colorado clinicians of this cluster and requesting reports of similar cases. One additional case with similar neurologic findings was reported as a result of this advisory and is currently under investigation. On September 26, CDC issued a national Health Advisory (available at http://www.bt.cdc.gov/han/han00370.asp), which provides guidance for identifying and reporting cases. Clinicians should report to their local and state health departments patients aged ≤21 years with 1) acute onset of focal limb weakness occurring on or after August 1, 2014, and 2) magnetic resonance imaging showing a spinal cord lesion largely restricted to gray matter. To prevent infections in general, persons should stay home if they are ill, wash their hands often with soap and water, avoid close contact (such as touching and shaking hands) with those who are ill, and clean and disinfect frequently touched surfaces.

Acknowledgments

Adam Wallace, MD, Jan Ludke, MD, Christine Robinson, PhD, Nicholas Stence, MD, Carolyn Brock, Children's Hospital Colorado. Rachel Herlihy, MD, Nisha Alden, MPH, Colorado Department of Public Health and Environment. Susan Gerber, MD, Brian Rha, MD, Margaret Cortese, MD, James Sejvar, MD, Claire Midgley, PhD, Mila Prill, MSPH, Shannon Rogers, MS, J. Erin Staples, MD, Mark Pallansch, PhD, and the EV-D68 laboratory investigation group, CDC.

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Acute Flaccid Paralysis with Anterior Myelitis — California, June 2012–June 2014

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On October 3, 2014, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

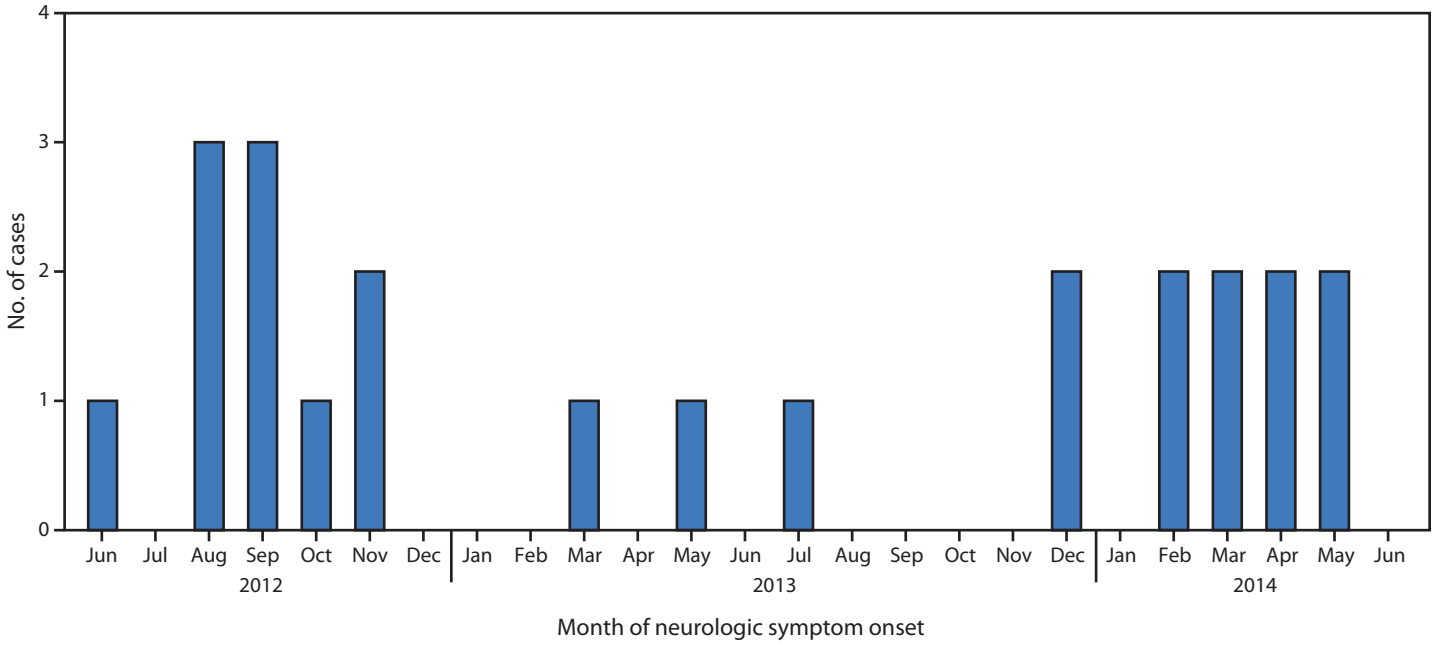
In August 2012, the California Department of Public Health (CDPH) was contacted by a San Francisco Bay area clinician who requested poliovirus testing for an unvaccinated man aged 29 years with acute flaccid paralysis (AFP) associated with anterior myelitis (i.e., evidence of inflammation of the spinal cord involving the grey matter including anterior horn cell bodies) and no history of international travel during the month before symptom onset. Within 2 weeks, CDPH had received reports of two additional cases of AFP with anterior myelitis of unknown etiology. Testing at CDPH's Viral and Rickettsial Disease Laboratory for stool, nasopharyngeal swab, and cerebrospinal fluid (CSF) did not detect the presence of an enterovirus (EV), the genus of the family *Picornaviridae* that includes poliovirus. Additional laboratory testing for infectious diseases conducted at the CDPH Viral and Rickettsial Disease Laboratory did not identify a causative agent to explain the observed clinical syndrome reported among the patients. To identify other cases of AFP with anterior myelitis and elucidate possible common etiologies, CDPH posted alerts in official communications for California local health departments during December 2012, July 2013, and February 2014. Reports of cases of neurologic illness received by CDPH were investigated throughout this period, and clinicians were encouraged to submit clinical samples for testing. A total of 23 cases of AFP with anterior myelitis of unknown etiology were identified. Epidemiologic and laboratory investigation did not identify poliovirus infection as a possible cause for the observed cases. No common etiology was identified to explain the reported cases, although EV-D68 was identified in upper respiratory tract specimens of two patients. EV infection, including poliovirus infection, should be considered in the differential diagnosis in cases of AFP with anterior myelitis and testing performed per CDC guidelines (*1*).

A case was defined as AFP in at least one limb consistent with anterior myelitis, as indicated by neuroimaging of the spine or electrodiagnostic studies (e.g., nerve conduction studies and electromyography), and with no known alternative etiology, in a person with symptom onset during January 2012–June 2014. Among the 23 cases identified, younger persons and males were more frequently affected, with a median age of 10 years (range = 1–73 years); 15 were aged <15 years, and 56% were male. Similar to the race/ethnicity distribution in California, seven (30%) patients were white, six (26%) were Asian, six (26%) were Hispanic, one (4%) was black, one (4%) was of multiple race, and two (9%) were of unknown race. Affected patients resided in diverse geographic areas throughout California with no indication of clustering. During the 30-month inquiry, no indication of seasonality or temporal trends in disease onset was established (Figure).

Common features among the clinical presentations of patients included an upper respiratory or gastrointestinal prodrome <10 days before AFP onset (83%), CSF pleocytosis (83%), and absence of sensory deficits (78%). Ten patients (43%) also had concomitant mental status changes; eight patients (34%) had cranial nerve abnormalities. Patients typically had extended hospital stays (median = 17 days), and of 13 patients with available information, all had prolonged paralysis persisting at 60 days follow-up. Five patients were ventilator-dependent when discharged from the hospital to rehabilitation facilities, and one death was reported in an adult. Of 10 patients with mental status changes, eight (80%) had returned to baseline cognitive function at the time of discharge.

Specimens were available for testing from 19 (83%) of the patients. The CDPH Viral and Rickettsial Disease Laboratory tested nasopharyngeal or throat swabs (18), stool or rectal swabs (14), serum (17), and CSF (17) for evidence of recent infection with numerous infectious agents, including EVs (including poliovirus), arboviruses, herpes viruses (HSV-1, HSV-2, VZV, and EBV), parechoviruses, adenoviruses, rabies, influenza A and B, human metapneumovirus, respiratory syncytial virus, parainfluenza 1–4, *Mycoplasma pneumoniae*, rickettsial pathogens, and free-living amoebas. Results were unremarkable except for the following: 1) mycoplasma immunoglobulin M–positive serologies in two patients (these same patients had negative mycoplasma throat polymerase chain reaction [PCR] tests), 2) rhinovirus-positive PCR from a respiratory specimen in one patient, and 3) EV-positive PCR from throat or upper respiratory tract specimens in two patients; these EVs were sequenced as EV-D68. Testing was limited by incomplete and late collection of specimens; respiratory samples collected <7 days of paralysis onset were submitted for nine (39%) patients, and stool or rectal specimens were

FIGURE. Number of cases of acute flaccid paralysis with anterior myelitis (N = 23), by month of neurologic symptom onset — California, 2012–2014



submitted for 15 (65%) patients. Specimens meeting World Health Organization (WHO) or CDC guidelines for poliovirus detection (e.g., two stool specimens collected ≥24 hours apart and <14 days after symptom onset) were submitted for only two of the patients. Serologic testing was of limited value because specimens often were collected after patients had received intravenous immunoglobulin (IVIG) therapy.

Poliovirus was determined to be an unlikely etiology for any of the cases based on epidemiologic and limited laboratory investigation findings. Nonetheless, because AFP with anterior myelitis is the classic presentation of paralytic poliomyelitis, CDPH attempted to rule out poliovirus infection. Of 14 patients with available information, 12 had previously received polio vaccine; one child and one adult were unvaccinated because of personal belief exemptions. Pre-IVIG serum was available from the unvaccinated child and tested negative for neutralizing antibodies against poliovirus at CDC laboratories. None of the patients reported travel out of the United States during the month before symptom onset.

Discussion

AFP has numerous etiologies and can prove diagnostically challenging; however, after the widespread implementation of polio vaccination worldwide, the subset of patients suffering from AFP with anterior myelitis is markedly smaller than the population of patients suffering from other forms of AFP. AFP is not a reportable syndrome in California, or any other U.S. state, other than as an occurrence of an unusual disease, and whether these cases represent an actual increase from baseline incidence of AFP with anterior myelitis in this population is unclear. A study examining AFP in children aged <15 years in California during 1992–1998 reported an incidence of 1.4 AFP cases per 100,000 children per year, with the most common diagnoses being Guillain-Barré syndrome (23%), unspecified AFP (21%), and botulism (12%). None of the 245 reviewed cases had recognized anterior myelitis, which is characteristic of paralytic poliomyelitis (*2*).

The etiology of AFP with anterior myelitis in the cases described in this report remains undetermined. EVs circulate widely in the United States, causing an estimated 10–15 million symptomatic, mostly nonneurologic illnesses annually (*2,3*). EVs, other than poliovirus, are rarely known to result in AFP with anterior myelitis. EV-D68 infections in most patients manifest as purely respiratory illnesses. A single case of an EV-D68 infection associated with AFP has been reported in the literature (*4*), and an additional case was reported through nationwide EV surveillance (*5*). CDC is working with state and local health departments to better characterize the respiratory disease health burden and spectrum of illness associated with the recent increase in EV-D68 respiratory illness across the United States (*6*). The significance of EV-D68 detection in two of the cases in this report is unclear, particularly because it was detected in upper respiratory tract specimens and not CSF. However, EVs can prove challenging to identify as a cause of neurologic syndromes, including AFP. Poliovirus and EV-A71, well-documented causes of serious neurologic disease including

poliomyelitis-like paralysis, are infrequently recovered from spinal fluid (*7,8*). In addition, delayed collection of laboratory specimens after respiratory illness and paralysis onset might have reduced the capacity to recover etiologic agents.

Paralysis caused by poliovirus infection results from anterior horn cell injury and is characterized by poor recovery of motor function. Sensory loss, as reported in 22% of the cases in this report, is not a feature commonly associated with patients with paralysis because of poliovirus infection. However, sensory symptoms (e.g., pain and paresthesia) have been reported with poliovirus infections. The last cases of paralytic poliomyelitis caused by endemic transmission of wild poliovirus in the United States occurred in 1979. Global poliovirus eradication efforts have greatly reduced the risk for introduction of poliovirus into the United States; wild-type poliovirus is currently endemic only in Afghanistan, Nigeria, and Pakistan; however, polio has been exported to countries that have previously been polio-free, and seven other countries have had cases or transmission of wild poliovirus in the last 12 months (*9*). Cases of vaccine-associated paralytic poliomyelitis cases do occur in countries using oral poliovirus vaccine (OPV) (*10*). OPV is no longer available in the United States; inactivated poliovirus vaccine has been recommended exclusively in the United States since 2000.

Although polio is no longer endemic in the United States, ruling out poliovirus infection in clinically compatible, unexplained cases of AFP, particularly those with anterior myelitis, is important to ensure that any importation of poliovirus is quickly identified and investigated. WHO and CDC have guidelines for epidemiologic, clinical, and laboratory investigations of AFP to rule out poliovirus infection (*10*). Clinical and epidemiologic investigation should include a careful neurologic examination to characterize specific sensory (e.g., sensory symptoms versus sensory loss) as well as motor findings, querying patients about recent international travel (<30 days before onset), and contact with persons who recently traveled, particularly to regions with polio cases or regions where OPV is used. Documented history of vaccination and whether inactivated poliovirus vaccine or OPV was administered should be noted, including dates of administration, number of doses, and manufacturer, if the information is available.

Specimens should be collected early during the course of disease for laboratory testing. Collection of specimens should follow CDC and WHO guidelines and include two stool specimens collected ≥24 hours apart and <14 days after symptom onset, serum before administration of IVIG, and throat swabs. Of patients who had samples tested at the CDPH Viral and Rickettsial Disease Laboratory as described in this report, only two met the specifications for ruling out poliovirus infection as recommended by WHO or CDC guidelines*†§; all others lacked two stool specimens collected ≥24 hours apart and <14 days after symptom onset.

What is already known on the topic?

Acute flaccid paralysis (AFP) with anterior myelitis is not a reportable condition, and baseline rates of disease are unknown but are likely quite low. Data from 1992–1998 on children aged <15 years in California indicated an incidence of 1.4 AFP cases per 100,000 children per year and did not identify a single case of AFP with anterior myelitis. Viral causes of AFP with anterior myelitis include enteroviruses (including poliovirus), adenovirus, and flaviviruses such as West Nile virus. Enterovirus D68 has previously been reported to be associated with neurologic illness, although the scope of neurologic manifestations is unclear.

What is added by the report?

A total of 23 cases of AFP with anterior myelitis were identified during 2012–2014 in California. No common etiology was identified, although clinical laboratory findings supported a viral etiology. Two patients tested positive for enterovirus D68 from upper respiratory specimens.

What are the implications for public health practice?

Poliovirus infection should be ruled out in all cases of AFP with anterior myelitis of unknown etiology. The scope of illness associated with enterovirus D68 might include neurologic manifestations, including AFP.

Paralytic poliomyelitis cases are immediately reportable to all state and local health departments in the United States. A confirmed paralytic poliomyelitis case should be reported to CDC within 4 hours after meeting notification criteria.

Although AFP with anterior myelitis or grey matter involvement comprises a subset of patients with AFP, these cases can be challenging to distinguish at initial presentation before clinical, imaging, and laboratory study results are available. Thus, specimen collection to definitively rule out poliovirus infection from possible differential diagnoses should be considered among all patients with AFP of unknown etiology or a suspected viral etiology. This is particularly important for persons who are unimmunized and have a history of travel to countries with endemic polio or countries that use OPV for routine immunization.

Physicians treating patients with AFP of unknown etiology should work with their local and state health departments to

* Additional information about CDC guidelines is available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt12-polio.html.

† Additional information about WHO guidelines are available at https://www.hpsc.ie/hpsc/a-z/vaccinepreventable/polio/guidance/file,2461,en.pdf.

§ Additional information about CDPH specimen collection guidelines for infectious disease testing in cases of neurologic illness is available at http://www.cdph.ca.gov/programs/vrdl/pages/neurologicsurveillancetesting.aspx.

rule out poliomyelitis early during the course of disease. To ensure adequate specimens for poliovirus testing, specimens should be collected according to CDC and WHO guidelines.

Acknowledgments

David Bell, MD, Susan I. Gerber, MD, M. Steve Oberste, PhD, Mark Pallansch. PhD, Jane Seward, MBBS, John Watson, MD, CDC. Jill Hacker, PhD, Sharon Messenger, PhD, Debra Wadford, PhD, Dongxiang Xia, PhD, Viral and Rickettsial Disease Laboratory, California Department of Public Health.

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Notes from the Field

Use of Genotyping to Disprove a Presumed Outbreak of *Mycobacterium tuberculosis* — Los Angeles County, 2013–2014

Brian J. Baker, MD[1], Shameer Poonja, MPH[1], Myrna Mesrobian, MD[2], Anna Lai[2], Steven Hwang, MD[2]
(Author affiliations at end of text)

In early 2013, the Los Angeles County Department of Public Health learned of two patients diagnosed with tuberculosis (TB) who had received care at the same outpatient health care facility (facility A). Facility A is a center for infusions of chemotherapeutic and biologic agents and serves a large number of immunocompromised persons who were potentially exposed to infectious TB. If infected, immunocompromised persons are at elevated risk for progression to TB disease (*1*). The two patients (patient A and patient B) both had pulmonary TB, with acid-fast bacilli found on sputum-smear microscopy, and had visited facility A multiple times during their infectious periods. Despite initial concerns that these two cases could be the result of person-to-person transmission at facility A, genotyping of the *Mycobacterium tuberculosis* isolates from these two patients showed that they were infected with unrelated strains.

During the investigation surrounding the first two patients, two additional patients (patient C with TB adenitis and patient D with pulmonary TB) were found to have been present at facility A during the infectious period of patient B. Three of the four patients were born in countries with a high TB prevalence, and all four patients had significant comorbidities that promote the progression of *M. tuberculosis* infection to TB disease (e.g., malignancy, malnourishment, and diabetes mellitus). Of the 281 persons potentially exposed to either patient A or patient B in the waiting area or in one of the infusion rooms at facility A, 261 were initially evaluated. Evaluation of facility contacts was difficult and resource-intensive, because many patients at the facility had abnormal chest radiographs due to malignancy or radiation therapy, and health care providers set low thresholds for initiating evaluations of TB disease for these patients. Because of the epidemiologic connections between patients B, C, and D and the high prevalence of immunocompromising conditions among exposed persons, further expansion of the investigation was considered to address a presumed outbreak. However, while expansion was under consideration, genotyping results were received for the mycobacterial isolates from patients C and D; these results differed from each other and from the isolates from patients A and B, conclusively demonstrating that the four cases were unrelated (*2*).

Previous studies have demonstrated the value of genotyping to identify previously unrecognized outbreaks (including those across multiple jurisdictions) and to prioritize resources for public health action (*3*,*4*). In this instance, timely genotyping demonstrated that a presumed outbreak of TB was actually a series of unrelated cases, thereby allowing the Los Angeles County Department of Public Health to avoid expanded testing and save valuable resources. In settings with large numbers of foreign-born persons with risk factors for progression to TB disease (as was the case with facility A), coincidental groups of TB cases might be found given the expected high incidence of TB disease in these populations. Examples such as the one described in this report reflect the changing nature of TB epidemiology in Los Angeles County and the United States. Almost two thirds of reported TB cases in the United States are in foreign-born persons (*5*), and three fourths of the cases among foreign-born persons are likely the result of reactivation of latent TB infection, rather than person-to-person transmission in the United States (*6*).

As part of its investigation, Los Angeles County Department of Public Health recommended that future patients at facility A be routinely tested for *M. tuberculosis* infection, with treatment of persons found to have latent TB infection. Six months after the diagnosis of patient D, a fifth patient who had also received care at facility A was diagnosed with pulmonary TB; genotyping demonstrated that the fifth case was unrelated to the other four cases. Possible outbreaks of TB require an urgent public health response to interrupt further transmission; timely universal genotyping can ensure informed and efficient use of limited public health resources.

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Acknowledgments

Community Health Services, Public Health Laboratory, and Tuberculosis Control Program, Los Angeles County Department of Health; California Microbial Diseases Laboratory; CDC National Genotyping Service.

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Notices to Readers

Selected *MMWR* Reports Now Available in French

Selected *MMWR* reports related to the Ebola outbreak and response are now available in French. Beginning this week, the reports can be accessed on the *MMWR* website at http://www.cdc.gov/mmwr. Readers with questions pertaining to reports in French can send them to e-mail, mmwrq@cdc.gov.

MMWR in Brief Republished in *American Journal of Public Health*

MMWR in Brief is a new feature that provides summaries of serial publications (e.g., Recommendations and Reports, Surveillance Summaries, and Supplements) periodically on the *MMWR* website at http://www.cdc.gov/mmwr/mmwr_briefs.html. The feature was piloted with two postings in November 2013.

Beginning this month, *MMWR* is collaborating with the *American Journal of Public Health* (AJPH), which will republish the *MMWR* in Brief summaries. The first republished summary is for the report, "Outbreaks of Acute Gastroenteritis Transmitted by Person-to-Person Contact — United States, 2009–2010." That summary was republished online by AJPH on October 8 (available at http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2014.302301), along with an editorial describing the collaboration (available at http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2014.302321).

Announcements

National Latino AIDS Awareness Day — October 15, 2014

National Latino AIDS Awareness Day is observed each year on October 15 to focus on the continuing and disproportionate effects of human immunodeficiency virus (HIV) infection and acquired immune deficiency syndrome (AIDS) on the Hispanic or Latino population in the United States. Two of the three goals of the National HIV/AIDS Strategy are to reduce HIV incidence and to reduce HIV-related disparities (*1*).

Estimates of HIV incidence for 2010 indicate that Hispanics or Latinos had a rate of 27.5 per 100,000 population compared with 8.7 for non-Hispanic or Latino whites (*2*). In 2010, male-to-male sexual contact was attributed to an estimated 68% of new infections among all Hispanics or Latinos and an estimated 79% of new infections among Hispanic or Latino males. Among Hispanic or Latino females, high-risk heterosexual contact was attributed to an estimated 86% of new infections. Data from CDC's National HIV Behavioral Surveillance System show that, in 2011, 37% of Hispanic or Latino men who have sex with men did not know they were infected compared with 14% of non-Hispanic or Latino white men who have sex with men (*3*).

National Latino AIDS Awareness Day is an opportunity to encourage increased HIV prevention activities, such as HIV testing, for Hispanics or Latinos. CDC supports testing, access to care and treatment, and a range of other efforts to reduce HIV infection among Hispanics or Latinos. Additional information about CDC resources and activities for National Latino AIDS Awareness Day is available at http://www.cdc.gov/hiv/risk/racialethnic/hispaniclatinos.

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Global Handwashing Day — October 15, 2014

The 7th annual Global Handwashing Day will be observed October 15, 2014. This observance increases awareness and understanding of handwashing with soap as an effective and affordable way to prevent disease around the world.

Handwashing with soap has an important role to play in child survival and health. Approximately 2.2 million children aged <5 years die each year from diarrheal diseases and pneumonia, the top two causes of death among young children globally (*1*). Handwashing with soap can reduce the incidence of diarrhea among children aged <5 years by 30% (*2*) and the incidence of respiratory infections by 21% (*3*).

Although persons around the world clean their hands with water, few use soap to wash their hands. Washing hands with soap removes bacteria much more effectively (*4*).

Additional information on Global Handwashing Day is available from CDC at http://www.cdc.gov/features/globalhandwashing. General handwashing information is available from at http://www.cdc.gov/handwashing. Information on water-related hygiene is available at http://www.cdc.gov/healthywater/hygiene/index.html.

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Errata

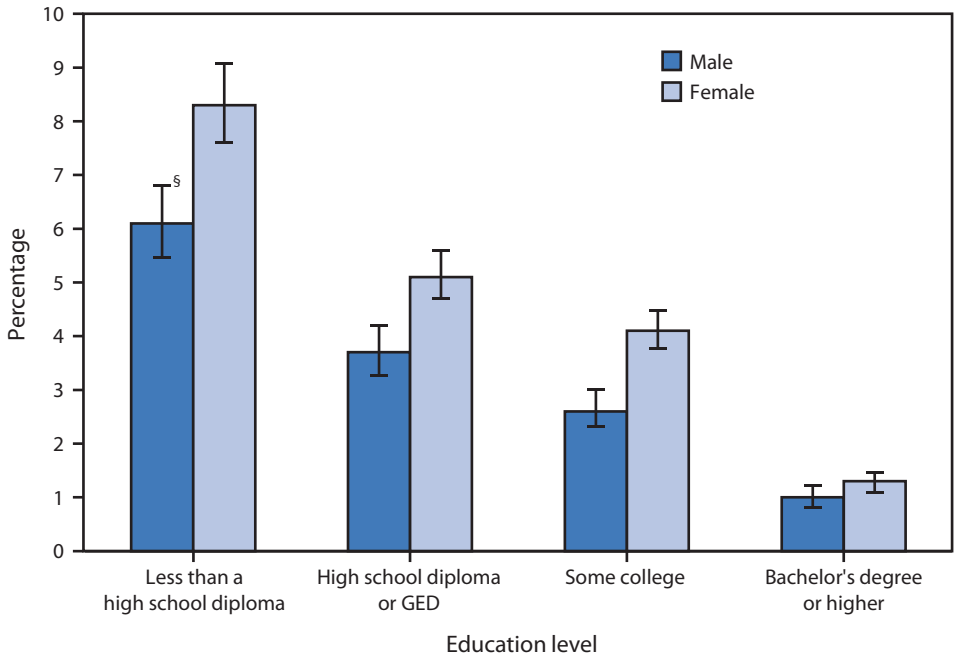
Vol. 63, No. 39

In the report, "Ebola Virus Disease Outbreak — West Africa, September 2014," errors occurred. In Figure 1, the only Ebola case in Senegal was shown as having been reported during epidemiologic week 12. That case should have been shown as reported during epidemiologic **week 36**. In Figure 2, the title should read, "Number of new cases of Ebola virus disease reported — West Africa, **September 7**–20, 2014," and the fifth entry in the legend should read, "100–**525**."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Adults Aged ≥25 Years with Serious Psychological Distress,* by Education Level and Sex — National Health Interview Survey,† United States, 2010–2013



Abbreviation: GED = general educational development certification.

* Serious psychological distress based on responses to the questions, "During the past 30 days, how often did you feel 1) so sad that nothing could cheer you up, 2) nervous, 3) restless or fidgety, 4) hopeless, 5) that everything was an effort, or 6) worthless?" Response codes for the six items for each person were summed to yield a point value on a 0–24 point scale. A value of 13 or more was used to define serious psychological distress.

† Estimates are based on household interviews of a sample of the noninstitutionalized U.S. civilian population. Estimates are age adjusted using the projected 2000 U.S. population as the standard population and using five age groups: 24–44 years, 45–54 years, 55–64 years, 65–74 years, and ≥75 years.

§ 95% confidence interval.

During 2010–2013, the total age-adjusted percentage of adults aged ≥25 years with serious psychological distress in the past 30 days was 3.5%. As educational attainment increased, the percentage with serious psychological distress decreased among both men and women. Serious psychological distress was six times higher for adults aged ≥25 years with less than a high school diploma (6.1% of men and 8.3% of women), compared with adults with a bachelor's degree or higher (1.0% of men and 1.3% of women). At all education levels, women were more likely than men to experience serious psychological distress.

Source: National Health Interview Survey. Available at http://www.cdc.gov/nchs/nhis.htm.

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The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format. To receive an electronic copy each week, visit *MMWR*'s free subscription page at *http://www.cdc.gov/mmwr/mmwrsubscribe.html*. Paper copy subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone 202-512-1800.

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ISSN: 0149-2195