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Progress Along the Continuum of HIV Care Among Blacks with Diagnosed HIV— United States, 2010

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National Black HIV/AIDS Awareness Day — February 7, 2014

February 7 is National Black HIV/AIDS Awareness Day, an observance intended to raise awareness of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and encourage action to reduce the disproportionate impact of HIV/AIDS on blacks in the United States. Compared with other races and ethnicities, blacks had the highest HIV incidence in 2010, with an estimated rate of 68.9 per 100,000 population, nearly eight times the estimated rate of 8.7 among whites (*1*).

By the end of 2010, an estimated 506,800 blacks were living with HIV in the United States, accounting for the highest percentage (44.3%) of persons living with HIV, followed by whites (33.0%), and Hispanics (19.3%) (*2*).

Information regarding National Black HIV/AIDS Awareness Day is available at http://www.cdc.gov/features/blackhivaidsawareness. Information regarding blacks and HIV/AIDS is available at http://www.cdc.gov/hiv/risk/racialethnic/aa/index.html.

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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*). Recently, by executive order, the HIV Care Continuum Initiative was established, focusing on accelerating federal efforts to increase HIV testing, care, and treatment (*2*). Blacks are the racial group most affected, comprising 44% of new infections (*3*) and also 44% of all persons living with HIV infection (*4*). To achieve the goals of NHAS, and to be

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consistent with the HIV Care Continuum Initiative, blacks with HIV need high levels of care and viral suppression (*5*–*7*). Achieving these goals calls for 85% of blacks 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 blacks with diagnosed HIV infection indicated that 74.9% of HIV-diagnosed blacks were linked to care, 48.0% were retained in care, 46.2% were prescribed antiretroviral therapy (ART), and 35.2% had achieved viral suppression. Black males had lower levels of care and viral suppression than black females at each step along the HIV care continuum; in addition, levels of care and viral suppression for blacks aged <25 years were lower than those for blacks aged ≥25 years at each step of the continuum. These data demonstrate the need for implementation of interventions and public health strategies that increase linkage to care and consistent ART among blacks, particularly black males and black youths.

Data from NHSS in 2010 reported to CDC through December 2012 were used to determine the numbers of blacks 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 blacks with new HIV diagnoses during 2010 who resided in any of the 19 jurisdictions at diagnosis. Retention in care** was assessed among blacks 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 (*8*).

* 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.

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Data from MMP were used to estimate ART prescription[††] and viral suppression[§§] among blacks aged ≥18 years using methods that have been described previously (*5*). The MMP values are weighted national estimates of the numbers of blacks who received medical care during January–April 2010 and had documentation of ART prescription and viral suppression. Percentages were calculated among blacks 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 8,261 blacks with HIV infection diagnosed during 2010 in the 19 jurisdictions, 6,186 (74.9%) were linked to care ≤3 months after HIV diagnosis (Table 1). Among males, 72.3% were linked to care, compared with 81.3% of females. Persons aged 13–24 years had the highest number of diagnoses of any age group, but the lowest percentage of linkage to care (68.8%); linkage increased with age group. By transmission category, males with infection attributed to male-to-male sexual contact had the lowest percentage of linkage to care (71.6%); the highest percentage was among females with infection attributed to injection drug use (82.4%), followed by females with infection attributed to heterosexual contact (81.1%).

Among the 153,581 blacks aged ≥13 years living with diagnosed HIV on December 31, 2010, in 19 jurisdictions, 48.0% were retained in care (Table 2). Of these, a lower percentage of males (46.5%) than females (50.9%) were retained in care. By age group, persons aged 25–34 years had the lowest percentage retained in care (42.8%), followed by persons aged 13–24 years (45.1%). By transmission category, the lowest percentage retained in care was among males with infection attributed to injection drug use (43.9%); the highest percentages were among females with infection attributed to injection drug use (50.9%) and females with infection attributed to heterosexual contact (50.6%).

Of 353,653 blacks aged ≥18 years living with diagnosed HIV on December 31, 2010, in the United States and Puerto Rico, 163,515 (46.2%) had an ART prescription (Table 3). Of these, a higher percentage of females (50.8%) than males (43.7%) had ART prescribed. Prevalence of ART prescription increased with age group; prevalence was 20.8% among blacks aged 18–24 years and 57.4% among those aged ≥55 years. The lowest level of ART prescription by transmission category was among males with infection attributed to injection drug use (34.0%); the highest level was among females with infection attributed to heterosexual contact (51.4%).

Of blacks living with diagnosed HIV in the United States and Puerto Rico, 35.2% achieved viral suppression at their most recent test. Of these persons, a higher percentage of females had suppressed VL (39.8%) than males (32.7%). Persons aged 18–24 years had the lowest level of viral suppression (18.3%) among all age groups. By transmission category, males with infection attributed to injection drug use had the lowest level of viral suppression (22.2%), and females with infection attributed to heterosexual contact had the highest level (41.3%).

Editorial Note

The results of the analysis described in this report indicate that, in 2010, among blacks with HIV diagnoses of all age groups and both sexes, 74.9% were linked to care, 48.0% were retained in care, 46.2% were prescribed ART, and 35.2% had achieved

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

Characteristic	No. HIV diagnoses	Linkage to care§	
		No.	(%)
Sex			
Male	5,927	4,288	(72.3)
Female	2,334	1,898	(81.3)
Age group at diagnosis (yrs)			
13–24	2,238	1,539	(68.8)
25–34	2,147	1,569	(73.1)
35–44	1,648	1,287	(78.1)
45–54	1,511	1,213	(80.3)
≥55	717	578	(80.6)
Transmission category¶			
Male-to-male sexual contact	4,348	3,115	(71.6)
Injection drug use			
Male	466	347	(74.6)
Female	323	266	(82.4)
Male-to-male sexual contact and injection drug use	168	124	(73.6)
Heterosexual contact**			
Male	939	696	(74.2)
Female	2,008	1,628	(81.1)
Total††	**8,261**	**6,186**	**(74.9)**

Abbreviation: HIV = human immunodeficiency virus.

* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis.

† 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 10 persons with diagnosed infection attributed to hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.

†† ART prescription was based on MMP data for all black MMP participants in the 2010 data collection cycle.

§§ Viral suppression was based on all black 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.

viral suppression. Improving health outcomes for blacks living with HIV infection is necessary to reduce HIV infection in the United States.

Blacks with HIV might not seek, receive, or adhere to HIV care or achieve viral suppression for reasons including lack of health insurance, poverty, and stigma (*9*). HIV programs that focus on care and treatment for blacks might strengthen efforts to link and retain HIV-infected persons 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 (*10*).

Among black persons with HIV in the United States, males had a lower prevalence than females of linkage to care, retention in care, ART prescription, and viral suppression. The youngest age group among blacks had lower percentages than other age groups of linkage to care, ART prescription, and viral suppression. In addition to interventions to ensure that all persons with HIV receive optimal care to improve health outcomes, targeted strategies for groups such as black males and black youths might be needed to achieve improvements at each step of the continuum.

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 44% of all blacks living with diagnosed HIV on December 31, 2010, in the United States and might not be representative

TABLE 2. Retention in HIV medical care among blacks 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.	Retained in care in 2010§ No.	(%)
Sex			
Male	101,836	47,324	(46.5)
Female	51,745	26,332	(50.9)
Age group on December 31, 2010 (yrs)			
13–24	9,715	4,383	(45.1)
25–34	23,718	10,159	(42.8)
35–44	41,948	19,640	(46.8)
45–54	50,643	25,637	(50.6)
≥55	27,557	13,837	(50.2)
Transmission category¶			
Male-to-male sexual contact	57,942	26,852	(46.3)
Injection drug use			
Male	19,637	8,619	(43.9)
Female	13,575	6,910	(50.9)
Male-to-male sexual contact and injection drug use	7,582	3,768	(49.7)
Heterosexual contact**			
Male	15,305	7,407	(48.4)
Female	36,666	18,563	(50.6)
Other††			
Male	1,371	677	(49.4)
Female	1,504	859	(57.1)
Total	**153,581**	**73,656**	**(48.0)**

Abbreviation: HIV = human immunodeficiency virus.

* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis.

† 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 test 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, or risk factor not reported or not identified.

TABLE 3. Antiretroviral prescription and viral suppression among blacks 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.†	Antiretroviral therapy (ART) prescription§ No.	(%)	Viral suppression¶ No.	(%)
Sex					
Male	228,794	100,013	(43.7)	74,753	(32.7)
Female	124,859	63,461	(50.8)	49,671	(39.8)
Age group at interview (yrs)					
18–24	19,994	4,161	(20.8)	3,666	(18.3)
25–34	56,711	20,890	(36.8)	14,395	(25.4)
35–44	100,232	42,220	(42.1)	32,525	(32.4)
45–54	117,235	62,077	(53.0)	46,866	(40.0)
≥55	59,481	34,167	(57.4)	27,011	(45.4)
Transmission category**					
Male-to-male sexual contact	123,819	58,276	(47.1)	45,813	(37.0)
Injection drug use					
Male	43,347	14,733	(34.0)	9,610	(22.2)
Female	28,703	14,289	(49.8)	10,407	(36.3)
Male-to-male sexual contact and injection drug use	16,346	8,065	(49.3)	6,096	(37.3)
Heterosexual contact††					
Male	43,392	18,287	(42.1)	12,854	(29.6)
Female	94,131	48,429	(51.4)	38,918	(41.3)
Other transmission§§	3,915	1,434	(36.6)	768	(19.6)
Total¶¶	**353,653**	**163,515**	**(46.2)**	**124,465**	**(35.2)**

Abbreviation: HIV = human immunodeficiency virus.

* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis.

† 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.

What is already known on this topic?

Blacks account for 44% of persons living with human immunodeficiency virus (HIV) but only 12% of the population in the United States. The percentages of blacks linked to care, retained in care, taking antiretroviral medications, and achieving viral suppression have been lower than other racial/ethnic groups.

What is added by this report?

This is the first known report to describe the continuum of HIV care among blacks in the United States. The results of this analysis of 2010 data indicate that 74.9% of HIV-infected blacks were linked to care, 48.0% were retained in care, 46.2% were prescribed antiretroviral therapy, and 35.2% had achieved viral suppression. Black males had lower levels of care and viral suppression than black females at each step along the HIV care continuum, and levels of care and viral suppression for blacks aged <25 years were lower than those for blacks aged ≥25 years.

What are the implications for public health practice?

Increasing the proportion of black persons 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 blacks, targeted strategies for different groups, such as males and youths, might be needed to achieve improvements at each step of the HIV care continuum.

of all blacks 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 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 that focus on blacks. CDC also supports multiple projects to optimize outcomes along the continuum of care, such as the Care and Prevention in the United States[***] demonstration project, which seeks to increase linkage to, retention in, and return to care for all HIV-infected persons, including racial and ethnic minorities, with the goal of reducing HIV-related morbidity and mortality by addressing social, economic, clinical, 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 blacks, particularly black males and black youths. 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.

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

[***] Additional information available at http://www.cdc.gov/hiv/prevention/demonstration/capus.

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HIV Infection Among Partners of HIV-Infected Black Men Who Have Sex with Men — North Carolina, 2011–2013

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The incidence of human immunodeficiency virus (HIV) infection has significantly increased among black men who have sex with men (MSM) in the United States, and young black MSM have been disproportionately affected (*1*). HIV-infected black MSM are also less likely to engage in HIV care (*2*) and achieve viral suppression (*3*) than MSM of other races/ethnicities. Engaging in care and achieving viral suppression is a multistep process that starts with diagnosis. Diagnosing persons unaware of their HIV status traditionally has been a critical component of HIV partner services, but partner services also provide an important opportunity to reengage HIV-infected partners in medical care. One approach for partner services involves contacting partners of persons with newly diagnosed HIV infection and using sexual and social network and molecular phylogenetic data to improve the continuum of HIV care among black MSM. To evaluate the effectiveness of that approach, results from a prospective partner services study conducted in North Carolina were examined, and one of the partner networks identified through this study was evaluated in depth. Overall, partner services were provided to 30 black, HIV-infected MSM who named 95 sex partners and social contacts, of whom 39 (41%) previously had been diagnosed with HIV infection. The partner network evaluation demonstrated that HIV-infected and HIV-negative partners were frequently in the same network, and that the majority of HIV-infected partners were already aware of their diagnosis but had not achieved viral suppression. Using partner services to ensure that HIV-infected partners are linked to care and treatment might reduce HIV transmission and might improve outcomes along the continuum of care.

Partner services include a broad array of medical (e.g., linkage to HIV medical care and treatment), prevention (e.g., education and counseling to reduce further HIV transmission), and psychosocial services provided to persons diagnosed with HIV infection and their partners. One critical function of partner services is partner notification, a process routinely used in the prevention and control of sexually transmitted diseases (STDs), including HIV. Persons infected with HIV are interviewed to elicit information about their partners (both sexual and needle-sharing) and social contacts who can then be confidentially notified of their possible exposure to or potential risk for HIV infection (*4*). Partner notification, as conducted by a health department, is a network-based approach to HIV prevention and treatment. Having information about networks with active HIV transmission provides an opportunity to interrupt chains of transmission (*5*). Contacting partners within a potential HIV transmission network allows public health practitioners to diagnose HIV-infected persons who are unaware of their status, help HIV-infected partners engage or reengage in medical care, and refer at-risk but HIV-negative partners for HIV prevention services.

Screening Targeted Populations to Interrupt Ongoing Chains of HIV Transmission with Enhanced Partner Notification (STOP) is a prospective study evaluating acute HIV infection diagnosis linked to partner services at 12 HIV testing sites in North Carolina; New York, New York; and San Francisco, California (*6*). Participants were screened with a rapid HIV enzyme immunoassay (IA). Reactive results were confirmed with a Food and Drug Administration (FDA)–approved HIV-1/HIV-2 antibody differentiation assay (Multispot HIV-1/HIV-2 Rapid Test [Multispot], Bio-Rad Laboratories). Specimens that were negative by the rapid IA were screened for acute HIV infection with a fourth-generation combination antigen/antibody IA (Architect HIV Ag/Ab Combo assay, Abbott Diagnostics) and an HIV-1 RNA test (Aptima HIV-1 RNA qualitative assay, Gen-Probe; 80 rapid negative specimens were pooled for this testing). Repeatedly reactive Architect or Aptima results were confirmed with a second HIV-1 RNA test (m2000 RealTime HIV-1 quantitative assay, Abbott Diagnostics). Based on this testing, HIV-infected participants were diagnosed with either 1) acute HIV infection (HIV rapid test negative but HIV-1 RNA detectable); 2) new, established HIV infection (HIV rapid test reactive and not previously diagnosed); or 3) previously diagnosed HIV infection (HIV rapid test reactive but previously diagnosed).

For partner services, HIV-infected participants (index patients) were offered notification services. Contact information was elicited for sex partners from the previous 3 months for index patients with acute HIV infection and the previous 12 months for index patients with established or previously diagnosed HIV infection. In addition, contact information was elicited for social contacts considered by the index patient to be at high risk for HIV infection (i.e., those who would benefit from an HIV test). Health department personnel trained as

disease intervention specialists contacted sex partners and social contacts and used Internet-based communication (e.g., e-mail and social network messaging) and text messaging when available. Sex partners and social contacts were offered HIV testing. HIV status was defined as 1) previously diagnosed HIV infection, 2) newly diagnosed HIV infection, 3) HIV-negative (HIV testing during partner services was negative), or 4) HIV status unknown (could not be located or refused testing). HIV polymerase (*pol*) gene sequences of newly diagnosed HIV-infected persons were analyzed with standard phylogenetic techniques (*7*) to provide further insight into HIV transmission networks. Specifically, persons were considered to form a cluster when their HIV *pol* sequences were genetically very similar (>97% of aligned nucleotides were identical) and there was high statistical support in phylogenetic analyses (bootstrapping >99% and posterior probabilities =1.0) to suggest the sequences were highly related compared with local controls. This analysis was limited to a subset of black MSM tested in the STOP study in North Carolina for whom HIV-1 *pol* sequences were available.

During September 2011–December 2012, partner notification services were provided to 30 black MSM (median age = 23 years) who had a reactive HIV test result and an available HIV-1 *pol* sequence in the STOP study in North Carolina (45 black MSM who had a reactive HIV test result in the STOP study, but without an HIV-1 *pol* sequence, were excluded from this analysis). The 30 index patients named 95 persons (74 sex partners and 21 social contacts), of whom 39 (41%) previously had been diagnosed with HIV infection, including 14 who had been diagnosed within the most recent year and 17 who were aged <25 years. An additional 29 (31%) of the 95 named sex partners and social contacts accepted an HIV test, and two sex partners (7% of tested and 3% of all sex partners) were newly diagnosed with HIV infection. Of the remaining sex partners and social contacts, eight refused HIV testing, eight refused any partner services counseling, and 11 could not be located. Most sex partners and social contacts were male (98%) and black (81%), with a median age of 26 years (Table). Sex partners were not more likely to be HIV-infected compared with social contacts (p=0.49), and regular (defined as having sex at least weekly) sex partners were not more likely to be HIV-infected compared with nonregular (having sex less than weekly) sex partners (p=0.16). Considering sex partners only, 18 (60%) of the 30 index patients had at least one HIV-infected sex partner identified, and 12 of 17 index patients who named more than one sex partner had both HIV-infected and HIV-negative sex partners.

HIV *pol* gene sequences were available for the 30 index patients, but not for their 95 sex partners and social contacts. Although none of the 30 index patients named another index patient as a sex partner, phylogenetic analyses identified four highly supported clusters involving eight (27%) index patients (two men per cluster). The sexual network and molecular phylogenetic data were combined for each of these four clusters. Based on data collected during April 2012–April 2013, the largest of the resulting networks included 23 black MSM connected by 20 sexual relationships, one social contact, and one molecular phylogenetic link (Figure). Overall, 15 (65%) were HIV-infected, six (26%) tested HIV-negative, one refused HIV testing, and one could not be located. A majority of men in this network were young (aged <25 years), but age-disparate sexual relationships were also represented, and the oldest person in the network was named by four persons (no other member of the network was named by more than two persons). Among nine partners with previously diagnosed HIV infection at the time of the investigation, eight (89%) had been diagnosed within the previous 2 years, but only two were in HIV medical care and only one had achieved viral suppression. Partner services facilitated linkage to care for nine of the HIV-infected partners who were out-of-care, and five additional men achieved viral suppression by August 2013, including the person named by four other persons. Of the six HIV-negative men, five had previously been tested for HIV, but only one had been tested within the last year.

What is already known on this topic?

The incidence of human immunodeficiency virus (HIV) infection has significantly increased among black men who have sex with men (MSM) in the United States, and young black MSM have been disproportionately affected. Previous studies have demonstrated that black MSM have risk behaviors similar to MSM of other racial and ethnic groups but are more likely to have an HIV exposure within their sexual network.

What is added by this report?

Among black MSM who received partner services in North Carolina, a high proportion (41%) of sex partners and social contacts had been previously diagnosed with HIV infection, whereas only 2% of partners were newly diagnosed with HIV infection. Based on sexual and social network and molecular phylogenetic data, a representative partner network demonstrated that HIV-infected and HIV-negative partners were frequently in the same network and that the majority of HIV-infected partners were already aware of their diagnosis but had not achieved viral suppression.

What are the implications for public health practice?

Diagnosing persons unaware of their HIV status provides a potential opportunity to reengage HIV-infected partners already aware of their status in medical care. This public health intervention might be particularly important among young black MSM in an HIV transmission network, who are disproportionately affected by new HIV infections and less likely to maintain sustained access to HIV medical care.

TABLE. Demographic characteristics of sex partners and social contacts of human immunodeficiency virus (HIV)-infected Screening Targeted Populations to Interrupt Ongoing Chains of HIV Transmission with Enhanced Partner Notification (STOP) study participants, by partner's HIV status — North Carolina, September 2011–December 2012

	HIV-infected (n = 41*)		HIV-negative (n = 27)		HIV status unknown (n = 27)		Total (n = 95)	
Partner characteristics	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
Sex								
Male	41	(100)	26	(96)	26	(96)	93	(98)
Female	0	—	1	(4)	1	(4)	2	(2)
Race								
Black	30	(73)	23	85)	24	(89)	77	(81)
White	8	(20)	3	(11)	2	(7)	13	(14)
Other	3	(7)	1	(4)	1	(4)	5	(5)
Residence								
North Carolina	40	(98)	24	(89)	22	(81)	86	(91)
Other state	1	(2)	3	(11)	5	(19)	9	(9)
Partner type								
Sex partner	30	(73)	24	(89)	20	(74)	74	(78)
Social contact	11	(27)	3	(11)	7	(26)	21	(22)
Index case, HIV status								
Acute HIV infection	6	(15)	7	(26)	4	(15)	17	(18)
Established HIV infection	29	(71)	15	(56)	19	(70)	63	(66)
Previously diagnosed HIV infection	6	(15)	5	(19)	4	(15)	15	(16)
Frequency of sexual contact†								
Regular sex partner	9	(22)	4	(15)	3	(11)	16	(17)
Occasional sex partner	4	(10)	7	(26)	6	(22)	17	(18)
Infrequent sex partner	17	(41)	13	(48)	11	(41)	41	(43)
Social contact	11	(27)	3	(11)	7	(26)	21	(22)
Contact information provided§								
Internet information only	1	(14)	1	(14)	5	(71)	7	(7)
Address or telephone number	35	(85)	23	(85)	20	(74)	78	(82)
Internet, address, and telephone number	5	(12)	3	(11)	2	(7)	10	(11)

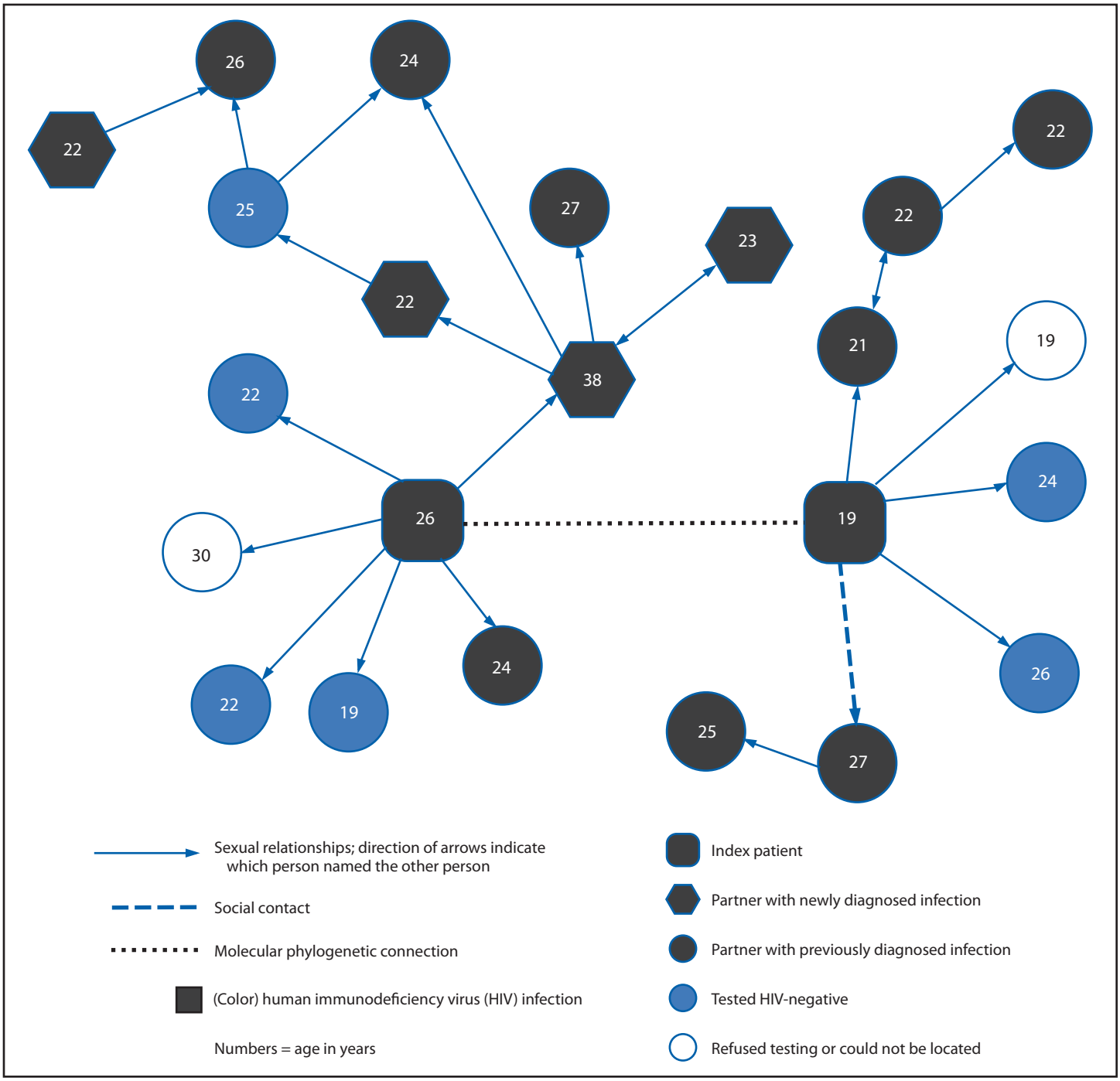
* Includes 39 persons with previously diagnosed HIV infection and two persons with newly diagnosed HIV infection.
† Frequency of sexual contact was defined as regular (had sex at least weekly), occasional (at least monthly but less than weekly), and infrequent (sex less often than monthly or one time only).
§ Information that was provided by the index patient (the participant diagnosed with HIV infection in the STOP study) to allow partner services staff to contact their partners.

Editorial Note

Partner notification is an important opportunity to diagnose persons who are unaware of their HIV infection. This report illustrates that partner notification can also be an important opportunity to identify and link to care HIV-infected partners who are aware of their diagnosis but have not achieved viral suppression. This public health intervention might be particularly important among young black MSM, who are disproportionately affected by new HIV infections and less likely to maintain sustained access to HIV medical care (*3*). Among black MSM in this analysis who were diagnosed with HIV infection, HIV-infected sex partners and social contacts were almost 20 times as likely to have previously diagnosed HIV infection as newly diagnosed HIV infection. These persons are particularly important to reengage in care because they are in a network with potential for further HIV transmission.

Previous studies have demonstrated that black MSM have risk behaviors similar to MSM of other racial and ethnic groups (*8*) but are more likely to have an HIV exposure within their sexual network (*9*). This study demonstrates this high-risk environment quantitatively and within an illustrative network. This study suggests that HIV-negative men within these networks remain at-risk for HIV infection and could benefit from preventive interventions (e.g., interactive Internet and mobile device educational resources), more frequent HIV testing and partner testing (e.g., every 3–6 months), and referral for HIV preexposure prophylaxis (PrEP) if they meet clinical criteria (*10*). A substantial proportion (27%) of the 30 black MSM in this report had an HIV *pol* sequence that clustered by molecular phylogenetic analysis with a person who was not reported as a sex partner. This finding is consistent with the named sex partner and social contact characteristics, which were relatively homogeneous with respect to age (predominantly young), race/ethnicity (81% black), and geography (91% from North Carolina). This degree of clustering and homogeneity suggests that sexual networks among black MSM in North Carolina are highly connected, and that HIV prevention efforts targeting persons (e.g., facilitating access to antiretroviral treatment if HIV-infected or PrEP if HIV negative) in a central sexual network location might result in substantial decreases in HIV transmission.

FIGURE. A combined sexual, social, and molecular phylogenetic network of 23 black men who have sex with men, connected by 20 sexual relationships — Screening Targeted Populations to Interrupt Ongoing Chains of HIV Transmission with Enhanced Partner Notification (STOP) study, North Carolina, April 2012–April 2013



The findings in this report are subject to at least two limitations. First, partner services were provided to men who had been diagnosed at one of three sexually transmitted infection clinics in North Carolina, and results might not be generalizable to all black MSM. In addition, black MSM without an available HIV-1 *pol* sequence were excluded, which might exclude men who are less likely to link to medical care. However, the results are consistent with national statistics demonstrating high rates of incident HIV infections among black MSM (*1*), and provide context regarding the underlying drivers of HIV transmission and suggest potential interventions to interrupt these transmissions. Second, sexual-social and phylogenetic

networks are limited by self-report and the availability of viral sequences. These networks do not, therefore, include all persons involved in a transmission chain or cluster, nor do they indicate the directionality of HIV transmission. This report does, however, demonstrate the high risk for potential future HIV transmissions within these networks and suggests that a partner services intervention to reengage partners with previously diagnosed HIV infection in HIV medical care might be an effective prevention strategy in this setting.

In this prospective evaluation of partner services provided to black MSM in North Carolina, a high proportion of sex partners and social contacts previously had been diagnosed with HIV infection, and a high proportion of networks had both HIV-infected and HIV-negative sex partners. Partner notification might offer an important means to ensure that all HIV-infected partners (new and previously diagnosed) within these HIV transmission networks engage in HIV medical care. Interventions for HIV-infected (e.g., antiretroviral treatment) and HIV-negative (e.g., PrEP) partners could have a substantial impact on transmission within these networks, improving the HIV continuum of care among black MSM and reducing the number of new infections.

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Noninfluenza Vaccination Coverage Among Adults — United States, 2012

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Vaccinations are recommended throughout life to prevent vaccine-preventable diseases and their sequelae. Adult vaccination coverage, however, remains low for most routinely recommended vaccines (*1*) and well below *Healthy People 2020* targets.* In October 2013, the Advisory Committee on Immunization Practices (ACIP) approved the adult immunization schedule for 2014 (*2*). With the exception of influenza vaccination, which is recommended for all adults each year, vaccinations recommended for adults target different populations based on age, health conditions, behavioral risk factors (e.g., injection drug use), occupation, travel, and other indications (*2*). To assess vaccination coverage among adults aged ≥19 years for selected vaccines, CDC analyzed data from the 2012 National Health Interview Survey (NHIS). This report summarizes the results of that analysis for pneumococcal, tetanus toxoid–containing (tetanus and diphtheria vaccine [Td] or tetanus and diphtheria with acellular pertussis vaccine [Tdap]), hepatitis A, hepatitis B, herpes zoster (shingles), and human papillomavirus (HPV) vaccines by selected characteristics (age, race/ethnicity,† and vaccination target criteria). Influenza vaccination coverage estimates for the 2012–13 influenza season have been published separately (*3*). Compared with 2011 (*1*), only modest increases occurred in Tdap vaccination among adults aged 19–64 years, herpes zoster vaccination among adults aged ≥60 years, and HPV vaccination among women aged 19–26 years; coverage among adults in the United States for the other vaccines did not improve. Racial/ethnic gaps in coverage persisted for all six vaccines and widened for Tdap, herpes zoster, and HPV vaccination. Increases in vaccination coverage are needed to reduce the occurrence of vaccine-preventable diseases among adults. The Community Preventive Services Task Force and other authorities have recommended that health-care providers incorporate vaccination needs assessment, recommendation, and offer of vaccination into routine clinical practice for adult patients (*4,5*).

The NHIS collects information about the health and health care of the noninstitutionalized, civilian population in the United States using nationally representative samples. Interviews are conducted in respondents' homes by the U.S. Census Bureau for CDC's National Center for Health Statistics. Questions about receipt of recommended vaccinations for adults are asked of one randomly selected adult within each family in the household. The presence of high-risk conditions,§ as defined by ACIP for pneumococcal disease, was determined by responses to questions in the NHIS (*2*). Comprehensive information on all high-risk conditions for hepatitis B or A were not collected in the 2012 NHIS. Analyses were conducted to estimate Tdap vaccination of adults aged ≥65 years being collected in the NHIS for the first time starting in 2012. The final sample adult component response rate for the 2012 NHIS was 61.2%. Weighted data¶ were used to produce national vaccination coverage estimates. Point estimates and estimates of corresponding variances were calculated using statistical software to account for the complex sample design. Statistical significance was defined as $p<0.05$.

Pneumococcal Vaccination Coverage

Pneumococcal vaccination coverage (overall, for 23-valent pneumococcal polysaccharide vaccine [PPSV23], and for 13-valent pneumococcal conjugate vaccine [PCV13]) among adults aged 19–64 years at high risk was 20.0% overall, similar to the estimate from 2011 (Table 1). Coverage among whites aged 19–64 years at high risk was higher (21.4%) compared with Hispanics (13.8%) and Asians (13.2%), but coverage was not significantly different for blacks and non-Hispanics who indicated a race other than white, black, or Asian. Among adults aged ≥65 years, coverage was 59.9% overall, similar to the estimate for 2011. Coverage among whites aged ≥65 years (64.0%) was higher compared with all other racial/ethnic groups (Table 1).

Tetanus Vaccination Coverage

In 2012, the proportion of adults receiving any tetanus toxoid–containing vaccine during the past 10 years was 64.2%

* *Healthy People 2020* objectives and targets for immunization and infectious diseases are available at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=23.

† Race/ethnicity was categorized as Hispanic, black, white, Asian, and "other." Persons identified as Hispanic might be of any race. Persons identified as black, white, Asian, or other race are non-Hispanic. "Other" includes American Indian/Alaska Native and multiple race. The five racial/ethnic categories are mutually exclusive.

§ Adults were considered at high risk for pneumococcal disease or its complications if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers.

¶ Additional information on NHIS methods is available at http://www.cdc.gov/nchs/nhis/methods.htm.

TABLE 1. Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, high-risk status,* race/ethnicity, and other selected characteristics — National Health Interview Survey, United States, 2012

Vaccination, age group, high-risk status, and race/ethnicity†	Sample size	%	(95% CI)	Difference from 2011
Pneumococcal vaccination, ever§				
19–64 yrs, high risk				
Total	9,333	20.0	(18.9–21.1)	-0.1
White	5,736	21.4	(20.1–22.9)	1.3
Black	1,605	19.7	(17.4–22.2)	-3.1
Hispanic	1,326	13.8	(11.5–16.4)¶	-4.6**
Asian	350	13.2	(9.5–18.1)¶	1.2
Others	316	20.2	(15.2–26.2)	-1.5
≥65 yrs				
Total	7,076	59.9	(58.4–61.4)	-2.4
White	4,993	64.0	(62.3–65.7)	-2.5
Black	919	46.1	(41.7–50.6)¶	-1.5
Hispanic or Latino	698	43.4	(39.0–48.0)¶	0.3
Asian	373	41.3	(35.4–47.5)¶	1.0
Others	93	44.7	(32.6–57.5)¶	-22.7**
Tetanus vaccination, past 10 yrs††				
19–49 yrs				
Total	16,927	64.2	(63.2–65.1)	-0.3
White	8,969	69.7	(68.5–70.9)	0.1
Black	2,491	56.1	(53.5–58.6)¶	1.3
Hispanic	3,772	53.9	(51.9–56.0)¶	-2.4
Asian	1,195	54.3	(50.6–58.0)¶	1.9
Others	500	71.9	(66.5–76.8)	2.3
50–64 yrs				
Total	8,525	63.5	(62.1–64.8)	-0.4
White	5,577	67.5	(65.9–69.0)	-0.2
Black	1,373	52.3	(49.0–55.7)¶	-2.1
Hispanic	1,031	52.3	(47.8–56.8)¶	-0.3
Asian	371	48.2	(41.8–54.7)¶	3.1
Others	173	69.9	(60.3–78.0)	2.0
≥65 yrs				
Total	6,905	55.1	(53.6–56.7)	0.7
White	4,864	57.7	(55.9–59.5)	0.8
Black	904	44.6	(40.8–48.4)¶	0.2
Hispanic	678	44.8	(40.1–49.6)¶	-0.3
Asian	366	45.8	(39.5–52.2)¶	7.9
Others	93	50.2	(36.8–63.6)	-13.0
Tetanus vaccination including pertussis vaccine, past 7 yrs§§				
≥19 yrs				
Total	22,653	14.2	(13.6–14.9)	NA
White	13,135	16.1	(15.3–17.0)	NA
Black	3,434	9.8	(8.4–11.6)¶	NA
Hispanic	4,051	8.7	(7.6–10.0)¶	NA
Asian	1,526	14.7	(12.5–17.2)	NA
Others	507	21.4	(17.0–26.7)¶	NA
Living with an infant aged <1 yr	722	25.9	(22.4–29.8)	NA
Not living with an infant aged <1 yr	21,931	13.8	(13.2–14.5)	NA
19–64 yrs				
Total	17,695	15.6	(14.9–16.4)	3.2**
White	9,729	18.2	(17.2–19.2)	4.4**
Black	2,746	10.5	(8.9–12.3)¶	-0.5
Hispanic	3,544	9.2	(8.0–10.6)¶	1.5
Asian	1,237	16.2	(13.8–19.0)	4.5**
Others	439	22.7	(17.8–28.5)	3.0
Living with an infant aged <1 yr	716	25.9	(22.3–29.8)	4.4
Not living with an infant aged <1 yr	16,979	15.1	(14.4–15.9)	3.1**
≥65 yrs				
Total	4,958	8.0	(7.0–9.1)	NA
White	3,406	8.8	(7.6–10.2)	NA
Black	688	5.9	(3.7–9.4)	NA
Hispanic	507	3.3	(2.0–5.4)¶	NA
Asian	289	4.2	(2.4–7.3)¶	NA
Others	68	—¶¶		NA
Living with an infant aged <1 yr	6	—¶¶		NA
Not living with an infant aged <1 yr	4,952	8.0	(7.0–9.1)	NA

See table footnotes on page 97.

TABLE 1. (*Continued*) Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, high-risk status,* race/ethnicity, and other selected characteristics — National Health Interview Survey, United States, 2012

Vaccination, age group, high-risk status, and race/ethnicity†	Sample size	%	(95% CI)	Difference from 2011
Hepatitis A vaccination (≥2 doses), ever* **				
19–49 yrs				
Total	14,834	12.2	(11.5–13.0)	-0.3
White	7,887	12.2	(11.2–13.2)	-0.1
Black	2,207	11.3	(9.6–13.2)	0.1
Hispanic	3,341	10.5	(9.2–11.9)¶	-0.8
Asian	992	18.7	(15.7–22.1)¶	-0.4
Others	407	16.1	(11.4–22.2)	-5.0
Had traveled outside the United States since 1995, other than to Europe, Japan, Australia, New Zealand, or Canada	5,259	18.9	(17.6–20.3)	-1.2
Had not traveled outside the United States since 1995, other than to Europe, Japan, Australia, New Zealand, or Canada	9,548	8.6	(7.8–9.5)	0.2
With chronic liver conditions, overall	121	—¶¶		—¶¶
Hepatitis B vaccination (≥3 doses), ever†††				
19–49 yrs				
total	15,649	35.3	(34.3–36.2)	-0.7
white	8,296	37.5	(36.3–38.8)	-0.3
black	2,338	34.2	(31.5–36.9)¶	1.2
Hispanic	3,465	27.1	(25.1–29.2)¶	-1.8
Asian	1,105	39.7	(35.5–44.0)	-0.9
others	445	37.4	(31.9–43.3)	-6.7
With diabetes				
Overall	1,286	28.6	(25.4–32.1)	1.7
≥60 yrs, overall	1,907	15.1	(12.9–17.4)	2.6
Herpes Zoster (shingles) vaccination, ever§§§				
≥60 yrs				
Total	9,924	20.1	(19.1–21.2)	4.4**
White	6,957	22.8	(21.5–24.0)	5.2**
Black	1,354	8.8	(6.9–11.2)¶	0.9
Hispanic	990	8.7	(6.6–11.4)¶	0.7
Asian	487	16.9	(13.2–21.5)¶	3.0
Others	136	19.7	(11.5–31.6)	7.7
Human papillomavirus (HPV) vaccination among females (≥1 dose), ever¶¶¶				
19–26 yrs				
Total	2,300	34.5	(31.7–37.3)	5.0**
White	1,165	42.2	(38.5–46.0)	9.7**
Black	385	29.1	(23.4–35.7)¶	0.9
Hispanic	507	18.7	(14.9–23.1)¶	-1.5
Asian	148	15.6	(9.5–24.5)¶	-6.7
Others	95	41.2	(28.7–55.0)	2.2
19–21 yrs, total	760	44.3	(39.5–49.2)	1.2
22–26 yrs, total	1,540	28.2	(25.2–31.5)	6.7**
Human papillomavirus (HPV) vaccination among males (≥1 dose), ever¶¶¶				
19–26 yrs, total	1,783	2.3	(1.6–3.4)	0.2
19–21 yrs, total	634	2.4	(1.4–4.4)	-0.3
22–26 yrs, total	1,149	2.2	(1.3–3.8)	0.5

* Adults were considered at high risk for pneumococcal disease or its complications if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. Comprehensive information on high-risk conditions for hepatitis B or A was not collected in 2012.

† Race/ethnicity was categorized as Hispanic, black, white, Asian, and "other." Persons identified as Hispanic might be of any race. Persons identified as black, white, Asian, or other race are non-Hispanic. "Other" includes American Indian/Alaska Native and multiple race. The five racial/ethnic categories are mutually exclusive.

§ Respondents were asked if they had ever had a pneumonia shot.

¶ p<0.05 by t-test for comparisons, with non-Hispanic white as the reference.

** p<0.05 by t-test for comparisons between 2012 and 2011 within each level of each characteristic.

†† Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received tetanus-diphthera toxoid vaccine (Td) during the past 10 years or tetanus, diphthera, and acellular pertussis vaccine (Tdap) during 2005–2012.

§§ Respondents who had received a tetanus shot in the past 10 years were asked if their most recent shot was given in 2005 or later. Respondents who had received a tetanus shot since 2005 were asked if they were told that their most recent tetanus shot included the pertussis or whooping cough vaccine. Among 34,218 respondents aged ≥19 years, those without a "yes" or no" classification for tetanus vaccination status within the preceding 10 years (n = 1,861 [5.4%]), for tetanus vaccination status during 2005–2012 (n = 1,261 [3.7%]), or those who reported tetanus vaccination during 2005–2012, but were not told vaccine type by the provider (n = 6,986 [20.4%] or did not know vaccine type (Td or Tdap) (n = 1,457 [4.3%]) were excluded, yielding a sample of 22,653 respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

¶¶ Estimate is not reliable because of small sample size (<30) or relative standard error (standard error/estimates) >0.3.

*** Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many shots were received.

††† Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received ≥3 doses or <3 doses.

§§§ Respondents were asked if they had ever received a shingles vaccine.

¶¶¶ Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

for adults aged 19–49 years, 63.5% for adults aged 50–64 years, and 55.1% for adults aged ≥65 years (Table 1). The proportion of adults receiving tetanus vaccination during the past 10 years across all age groups did not change compared with 2011 (*1*). Whites had higher coverage across all age groups compared with blacks, Hispanics, and Asians.

Data on Tdap vaccination of adults aged ≥65 years were collected for the first time in 2012. Among adults aged ≥19 years for whom Tdap vaccination specifically could be assessed (including adults aged ≥65 years), overall coverage was 14.2% (Table 1). Tdap coverage was estimated after excluding from the 34,218 respondents all those for whom Tdap vaccination could not be confirmed, including those without a "yes" or "no" response for tetanus vaccination status in the past 10 years (n = 1,861 [5.4%]) or during 2005–2012 (n = 1,261 [3.7%]), and those who reported tetanus vaccination during 2005–2012 but were not told the vaccine type (n = 6,986 [20.4%]) or did not know the vaccine type (Td or Tdap) (n = 1,457 [4.3%]). Tdap coverage for black (9.8%) and Hispanic (8.7%) adults aged ≥19 years was lower compared with whites (16.1%), but coverage for those who indicated a race other than Asian, black, or white, and non-Hispanic ethnicity was higher (21.4%) than that for whites. Among adults aged 19–64 years, Tdap coverage increased compared with 2011 (a 3.2 percentage point increase to 15.6%) (Table 1); however, coverage among adults aged 19–64 years who reported living with an infant aged <1 year** was 25.9%, similar to the estimate for 2011. Tdap coverage among adults aged 19–64 years without household contact with an infant aged <1 year increased compared with 2011 (a 3.1 percentage point increase to 15.1%). Tdap coverage was higher for whites aged 19–64 years (18.2%) compared with blacks (10.5%) or Hispanics (9.2%). Tdap vaccination coverage among adults aged ≥65 years, overall and among those without household contact with an infant aged <1 year, was 8.0%. The sample was too small to estimate Tdap coverage among adults aged ≥65 years living with an infant aged <1 year. Coverage among Hispanics (3.3%) and Asians (4.2%) aged ≥65 years was lower than for whites (8.8%).

Among 13,145 respondents who received a tetanus vaccination during 2005–2012, 52.6% reported that they were not informed of the vaccination type, and 11.1% could not recall what type of tetanus vaccination they had received (Table 2). Of the remaining 36.3% of respondents who reported they knew what type of tetanus vaccine they received, 65.4% reported receiving Tdap.

** In 2006, a single dose of Tdap was recommended for adults who have or who anticipate having close contact with an infant aged <1 year (e.g., parents, grandparents, child-care providers, and health-care personnel) to reduce the risk for transmitting pertussis.

During 2005–2012, Tdap vaccination of health-care personnel (HCP) aged ≥19 years was 31.4% (Table 3). White HCP had higher Tdap coverage (33.0%) compared with black HCP (22.5%) and Hispanic HCP (25.1%). Compared with 2011, Tdap coverage increased for HCP aged 19–64 years (by 5.8 percentage points to 32.6%). Tdap coverage among HCP aged ≥65 years was 16.9% (Table 3).

Among adults aged 19–64 years who received a tetanus vaccination and reported they knew what type of tetanus vaccine they received, HCP were more likely to report receipt of Tdap (76.8%) than were non-HCP (64.3%) (Table 2). Tdap vaccination was similar among adults aged ≥65 years who were or were not HCP (Table 2).

Hepatitis A Vaccination Coverage

Hepatitis A vaccination coverage (≥2 doses) among adults aged 19–49 years was low overall (12.2%), and similar to the estimate for 2011 (12.5%). Coverage was higher for Asians (18.7%) than for whites (12.2%), but coverage for Hispanics (10.5%) was lower than for whites. Vaccination coverage was higher (18.9%) among adults aged 19–49 years who had traveled outside the United States since 1995 to a country of high or intermediate hepatitis A endemicity (countries other than Japan, Australia, New Zealand, Canada, and the countries of Europe) than among respondents who did not travel outside the United States or had traveled only to countries of low endemicity (8.6%). Vaccination coverage among adult travelers to highly endemic countries was similar to the estimate for 2011 (Table 1). Coverage among those with chronic liver conditions could not be reliably estimated because of small sample size.

Hepatitis B Vaccination Coverage

In 2012, comprehensive information on high-risk status for hepatitis B virus infection was not collected. Overall hepatitis B vaccination coverage (≥3 doses) among all adults aged 19–49 years was 35.3%, similar to the estimate for 2011 (Table 1). Vaccination coverage was lower for blacks (34.2%) and Hispanics (27.1%) compared with whites (37.5%). Vaccination coverage for persons with diabetes was 28.6% for those aged 19–59 years and 15.1% for those aged ≥60 years, similar to the estimates for 2011. Overall, hepatitis B vaccination coverage among HCP was 65.0%, similar to the estimate for 2011, and coverage among HCP did not differ significantly across racial/ethnic groups (Table 3).

Herpes Zoster Vaccination Coverage

In 2012, 20.1% of adults aged ≥60 years reported receiving herpes zoster vaccination to prevent shingles, an increase from the 15.8% reported in 2011 (Table 1). Coverage for whites

TABLE 2. Type of tetanus vaccine received, and proportion that were tetanus, diphtheria, acellular pertussis vaccine (Tdap), among adults aged ≥19 years who received a tetanus vaccination, by selected characteristics — National Health Interview Survey, United States, 2005–2012

	Type of vaccine received											
		Received Tdap		Received other tetanus vaccine		Doctor did not inform the patient		Could not recall vaccine type		Proportion that received Tdap*		
Characteristic	No. in sample	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	No. in sample	%	(95% CI)
≥19 yrs												
All adults	13,145	23.8	(22.7–24.9)	12.6	(11.8–13.4)	52.6	(51.2–54.0)	11.1	(10.2–12.0)	4,699	65.4	(63.5–67.3)
Health-care personnel†	1,501	44.0	(40.2–47.8)	13.7	(11.4–16.3)	33.1	(29.8–36.6)	9.3	(7.5–11.4)	857	76.3§	(72.0–80.1)
Non–health-care personnel	11,631	21.2	(20.2–22.3)	12.4	(11.6–13.3)	55.1	(53.6–56.5)	11.3	(10.4–12.2)	3,840	63.1	(61.0–65.1)
19–64 yrs												
All adults	10,932	24.9	(23.8–26.1)	12.5	(11.6–13.3)	51.5	(50.0–53.1)	11.1	(10.1–12.0)	4,065	66.7	(64.7–68.6)
Health-care personnel	1,394	44.8	(40.9–48.8)	13.5	(11.2–16.2)	32.7	(29.3–36.3)	8.9	(7.1–11.2)	809	76.8§	(72.5–80.6)
Non–health-care personnel	9,527	22.2	(21.0–23.3)	12.3	(11.4–13.3)	54.2	(52.6–55.8)	11.3	(10.3–12.4)	3,254	64.3	(62.0–66.4)
≥65 yrs												
All adults	2,213	16.8	(14.8–19.0)	13.1	(11.4–15.1)	59.0	(56.2–61.7)	11.1	(9.6–12.8)	634	56.1	(50.8–61.2)
Health-care personnel	107	30.1	(19.7–43.0)	16.2	(9.1–27.2)	39.0	(27.9–51.3)	14.7	(7.9–25.8)	48	65.0	(46.5–79.9)
Non–health-care personnel	2,104	16.2	(14.1–18.5)	13.0	(11.2–15.1)	59.9	(56.9–62.8)	10.9	(9.3–12.6)	586	55.4	(50.0–60.7)

* Calculated by dividing number of respondents who reported receiving Tdap by the sum of those who reported receiving Tdap and those who reported receiving other tetanus vaccinations. Respondents who reported that the doctor did not inform them of the vaccine type they received and those who could not recall the vaccine type were excluded.

† Adults were classified as health-care personnel if they reported they currently volunteer or work in a hospital, medical clinic, doctor's office, dentist's office, nursing home, or other health-care facility, including part-time and unpaid work in a health-care facility or professional nursing care provided in the home.

§ $p<0.05$ by t-test for comparisons between health-care personnel and non–health-care personnel.

aged ≥60 years increased by 5.2 percentage points compared with herpes zoster vaccination coverage estimates in 2011. Whites aged ≥60 years had higher herpes zoster vaccination coverage (22.8%) compared with blacks (8.8%), Hispanics (8.7%), and Asians (16.9%).

HPV Vaccination Coverage

In 2012, 34.5% of women aged 19–26 years reported receipt of ≥1 dose of HPV vaccine, an increase of 5 percentage points from the 29.5% reported for 2011 (Table 1) (*1*). Coverage was 44.3% among women aged 19–21 years and 28.2% among those aged 22–26 years (a 6.7 percentage point increase in this age group compared with 2011). Among women aged 19–26 years, blacks (29.1%), Hispanics (18.7%), and Asians (15.6%) had lower coverage compared with whites (42.2%), but coverage for non-Hispanics who indicated a race other than white, black, or Asian was similar to that of whites (41.2%). Receipt of ≥1 dose of HPV vaccine among males aged 19–26 years (2.3%) was similar to the estimate for 2011. Coverage was 2.4% for males aged 19–21 years and 2.2% for those aged 22–26 years.

Editorial Note

In 2011, adult vaccination coverage in the United States for diseases other than influenza was similar to 2011, except for modest increases in Tdap vaccination for adults aged 19–64 years, herpes zoster vaccination among older adults, and HPV vaccination among women aged 19–26 years, with no improvements in coverage for the other vaccines recommended for adults. Many adults have not received one or more recommended vaccines. Vaccination coverage estimates for the three vaccines in this report that are included in *Healthy People 2020* (pneumococcal, herpes zoster, and hepatitis B [for HCP] vaccines) are well below the respective target levels of 90% for persons aged ≥65 years and 60% for persons aged 18–64 years at high risk (pneumococcal vaccine [objectives IID 13.1 and IID 13.2, respectively]), 30% (herpes zoster vaccine [IID 14]), and 90% (hepatitis B vaccine for HCP [IID 15.3]). In addition, racial/ethnic gaps in coverage persisted for all six and widened for Tdap, herpes zoster, and HPV vaccination, with higher coverage for whites compared with other groups. These data indicate little progress was made in improving adult coverage in the past year and highlight the need for continuing efforts to increase adult vaccination coverage.

In 2006, ACIP recommended that adults aged 19–64 years receive a single dose of Tdap to replace a dose of Td for active booster vaccination against tetanus, diphtheria, and pertussis if they received their most recent dose of Td ≥10 years earlier (*6*). In 2010, ACIP recommended Tdap, when indicated, should be administered regardless of interval since the last Td, and that

TABLE 3. Estimated proportion of health-care personnel* who received selected vaccinations, by age group and race/ethnicity† — National Health Interview Survey, United States, 2012

Vaccination status	Sample size	%	(95% confidence Interval)	Difference from 2011
Tetanus vaccination including pertussis vaccine, past 7 years§				
≥19 yrs				
Total	2,105	31.4	(28.7–34.3)	NA
White	1,262	33.0	(29.5–36.7)	NA
Black	359	22.5	(17.4–28.5)¶	NA
Hispanic	262	25.1	(19.0–32.3)¶	NA
Asian	169	39.4	(30.2–49.5)	NA
Other	53	46.1	(27.7–65.7)	NA
19–64 yrs				
Total	1,911	32.6	(29.7–35.6)	5.8**
White	1,123	34.5	(30.7–38.5)	7.3**
Black	337	22.9	(17.7–29.1)¶	1.3
Hispanic	247	25.1	(18.8–32.7)¶	-4.9
Asian	154	41.4	(31.7–51.8)	13.7
Others	50	46.1	(27.2–66.1)	14.8
≥65 yrs				
Total	194	16.9	(11.3–24.6)	NA
White	139	17.5	(11.0–26.8)	NA
Black	22	—††	—	NA
Hispanic or Latino	15	—††	—	NA
Asian	15	—††	—	NA
Other	3	—††	—	NA
Hepatitis B vaccination (≥3 doses), ever§§				
≥19 yrs				
Total	2,767	65.0	(62.7–67.2)	1.1
White	1,692	65.5	(62.5–68.4)	0.4
Black	479	61.7	(56.4–66.7)	4.6
Hispanic	332	60.1	(53.1–66.7)	0.6
Asian	195	72.3	(63.4–79.7)	1.9
Other	69	75.9	(62.2–85.7)	5.9

Abbreviation: NA = not available.

* Adults were classified as health-care personnel if they reported that they currently volunteer or work in a hospital, medical clinic, doctor's office, dentist's office, nursing home, or other health-care facility, including part-time and unpaid work in a health-care facility or professional nursing care provided in the home.

† Race/ethnicity was categorized as Hispanic, black, white, Asian, and "other." Persons identified as Hispanic might be of any race. Persons identified as black, white, Asian, or other race are non-Hispanic. "Other" includes American Indian/Alaska Native and multiple race. The five racial/ethnic categories are mutually exclusive.

§ Respondents who had received a tetanus shot in the past 10 years were asked if their most recent shot was given in 2005 or later. Respondents who had received a tetanus shot since 2005 were asked if they were told that their most recent tetanus shot included the pertussis or whooping cough vaccine. Among 2,911 health-care personnel aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 63 [2.2%]) for tetanus vaccination status during 2005–2012 (n = 100 [3.4%]) or those who reported tetanus vaccination during 2005–2012, but who were not told vaccine type by the provider (n = 516 [17.7%]) or did not know vaccine type (tetanus and diphtheria vaccine [Td] or tetanus and diphtheria with acellular pertussis vaccine [Tdap]) (n = 127 [4.4%]) were excluded, yielding a sample of 2,105 respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

¶ p<0.05 by t-test for comparisons with non-Hispanic white as the reference.

** p<0.05 by t-test for comparisons between 2012 and 2011 within each level of each characteristic.

†† Estimate is not reliable because of small sample size (<30) or relative standard error (standard error/estimates) >0.3.

§§ Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received ≥3 doses or <3 doses.

adults aged ≥65 years who have or who anticipate having close contact with an infant aged <1 year, and who previously have not received Tdap, should receive a dose of Tdap to protect against pertussis and reduce the likelihood of transmission. In 2011, in an effort to prevent pertussis in infants, ACIP recommended a dose of Tdap for pregnant women who have not yet received a dose, then in 2012, expanded the recommendation for a Tdap dose during every pregnancy. In 2012, ACIP also updated the adult Tdap vaccination recommendation to include all adults aged ≥19 years who have not yet received a dose of Tdap, including those aged ≥65 years (*6*). Information on Tdap vaccination of adults aged ≥65 years was collected in the 2012 NHIS for the first time. Overall Tdap vaccination of adults aged ≥65 years was low; the sample size was too small to estimate coverage among adults aged ≥65 years living with an infant aged <1 year. Tdap vaccination coverage in 2012 among adults aged ≥65 years could reflect vaccination of those who received Tdap previously because of close contact with an infant aged <1 year, as well as early uptake in response to this recommendation. Health-care providers should not miss an opportunity to vaccinate adults aged ≥19 years who have not received Tdap previously.

In June 2012, ACIP recommended routine use of PCV13 in series with PPSV23 for adults aged ≥19 years with immunocompromising conditions, functional or anatomic asplenia, cerebrospinal fluid leaks, or cochlear implants.[††] Given the high burden of invasive pneumococcal disease caused by serotypes in PPSV23, but not in PCV13, ACIP noted that broader protection might be provided through use of both pneumococcal vaccines. Current ACIP recommendations call for use of PPSV23 in adults aged 19–64 years with chronic conditions that are not immunocompromising, such as chronic heart disease or diabetes, at the time of diagnosis of the high-risk condition (*6*). All adults are eligible for a dose of PPSV23 at age 65 years, regardless of previous PPSV23 or PCV13 vaccination; however, a minimum interval of 5 years between PPSV23 doses should be maintained. The 2012 NHIS did not estimate the proportion of pneumococcal vaccinations by type (PCV13 versus PPSV23). The overall pneumococcal vaccination estimates in this report could include some respondents who received PCV13.

In December 2011, ACIP recommended administration of hepatitis B vaccine to unvaccinated adults with diabetes aged 19–59 years (category A recommendation) or aged ≥60 years (category B recommendation) (*6*). The recommendations were based on available information about risk for contracting acute hepatitis B among persons with diabetes, morbidity and mortality among persons with diabetes, available vaccines, age at diagnosis of diabetes, and cost-effectiveness (*6*). Category A recommendations are made for all persons in an age- or risk-factor–based group. Category B recommendations do not apply to all persons within a group, they provide guidance to clinicians to help determine whether vaccination is appropriate for specific patients. Hepatitis B vaccination coverage in 2012 among persons with diabetes remained similar to estimates obtained before this recommendation and highlights the need to improve awareness of increased risk for contracting acute hepatitis B among persons with diabetes and to increase hepatitis B vaccination in this population.

Herpes zoster vaccination coverage increased in 2012 compared with 2011. Shortages of herpes zoster vaccine that might have contributed to lower uptake during the first years after licensure appear to have been resolved in 2012. The cost of herpes zoster vaccine and billing challenges might pose barriers for some patients and providers.[§§]

The percentage of age-eligible females who reported having received HPV vaccine increased steadily from 2009 to 2012 but is still low. A significant increase in HPV vaccination in 2012 compared with 2011 occurred among women aged 19–26 years (5.0 percentage points). An increase was observed among women aged 22–26 years (6.7 percentage points), but not among women aged 19–21 years. Because no data on age at vaccination were collected, it was not possible to determine whether vaccination occurred as part of an adolescent vaccination program or at age ≥19 years. In 2012, white women had higher HPV coverage than black, Hispanic, or Asian women. Similar findings have been reported previously (*7*). The percentage of age-eligible adult males administered HPV vaccine in 2012 was similar to the 2011 estimate. Coverage levels for adult males did not change during the first year following the ACIP recommendation for routine use of HPV vaccine in males aged 11–21 years and males aged 22–26 years at high risk (*6*). However, among adolescent males aged 13–17 years, 2012 HPV coverage estimates were higher than 2011 estimates (*8*). Continued efforts are needed to ensure coverage among the primary target group for HPV vaccine, girls and boys aged 11–12 years, and among all racial and ethnic groups. Efforts are also needed to improve catch-up vaccination among young adults who have not completed their vaccinations during adolescence.

The findings in this report are subject to at least five limitations. First, the NHIS sample excludes persons in the military and those residing in institutions, which might result in underestimation or overestimation of vaccination coverage levels. Second, the response rate was 61.2%. A low response rate can result in selection bias if the respondents and nonrespondents differ in their vaccination rates. Third, the determination of vaccination status and identification of high-risk conditions in NHIS were not validated by medical records. Self-report of

What is already known on this topic?

During 2008–2011, coverage with routinely recommended vaccinations among U.S. adults aged ≥19 years remained low.

What is added by this report?

Compared with 2011 estimates, modest gains occurred in tetanus and diphtheria toxoid with acellular pertussis vaccine (Tdap) vaccination among adults aged 19–64 years, herpes zoster vaccination among adults aged ≥60 years, and human papillomavirus vaccination coverage among women aged 19–26 years. Coverage for other vaccines and risk groups did not improve, and racial/ethnic disparities persisted for routinely recommended adult vaccines. Coverage for all vaccines for adults remained low.

What are the implications for public health practice?

Wider use of practices shown to improve adult vaccination is needed, including assessment of patients' vaccination needs by health-care providers and routine recommendation and offer of needed vaccines to adults, implementing reminder-recall systems, use of standing order programs for vaccination, and assessment of practice-level vaccination rates with feedback to staff members.

[††] Additional information available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6140a4.htm?s_cid=mm6140a4_w.

[§§] Additional information available at http://www.gao.gov/assets/590/587009.pdf.

vaccination might be subject to recall bias and overestimation of rates. However, adult self-reported vaccination status has been shown to be sensitive for all six vaccines in this report and specific for all except tetanus vaccination (*9*). Fourth, the Tdap estimate is subject to considerable uncertainty. Many respondents were excluded from estimations of Tdap coverage, creating a potential for bias. All respondents who reported a tetanus vaccination during 2005–2012 but were unable to say whether Td or Tdap was used were excluded. Sensitivity calculations were conducted to assess the magnitude of potential bias. Depending on what proportion of excluded respondents actually received Tdap, actual Tdap coverage could fall within the range of 11.2%–39.4% for adults aged 19–64 years and 6.0%–31.0% for adults aged ≥65 years. Comparisons of Tdap coverage across years within subgroups might be affected by bias resulting from excluding persons who did not report the type of tetanus vaccine they received. Finally, age at vaccination is not known for vaccines adults reported having "ever" received (e.g., HPV and hepatitis B vaccines), so it is not clear for younger adults whether vaccination occurred as an adult or as part of a child or adolescent vaccination program.

Vaccination coverage levels among adults are low. Improvement in adult vaccination is needed to reduce the health consequences of vaccine-preventable diseases among adults and to prevent pertussis morbidity and mortality in infants, who need the protection afforded by the Tdap vaccination during pregnancy recommendation. Successful vaccination programs combine 1) education of potential vaccine recipients and publicity to promote vaccination, 2) increased access to vaccination services in medical settings, and 3) use of practices shown to improve vaccination coverage, including reminder-recall systems, efforts to remove administrative and financial barriers to vaccination, use of standing order programs for vaccination, and assessment of practice-level vaccination rates with feedback to staff members (*4*). Health-care provider recommendations for vaccination are associated with patient vaccination (*10*). Routine assessment of adult patient vaccination needs, recommendation, and offer of needed vaccinations for adults should be incorporated into routine clinical care of adults (*4,5*). The adult immunization schedule (*2*), updated annually, provides current recommendations for vaccinating adults and a ready resource for persons who provide health-care services for adults in various settings.

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Global Control and Regional Elimination of Measles, 2000–2012

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In 2010, the World Health Assembly established three milestones toward global measles eradication to be reached by 2015: 1) increase routine coverage with the first dose of measles-containing vaccine (MCV1) for children aged 1 year to ≥90% nationally and ≥80% in every district, 2) reduce and maintain annual measles incidence at <5 cases per million, and 3) reduce measles mortality by 95% from the 2000 estimate (*1*).* After the adoption by member states of the South-East Asia Region (SEAR) of the goal of measles elimination by 2020, elimination goals have been set by member states of all six World Health Organization (WHO) regions, and reaching measles elimination in four WHO regions by 2015 is an objective of the Global Vaccine Action Plan (GVAP).† This report updates the previous report for 2000–2011 (*2*) and describes progress toward global control and regional elimination of measles during 2000–2012. During this period, increases in routine MCV coverage, plus supplementary immunization activities (SIAs)§ reaching 145 million children in 2012, led to a 77% decrease worldwide in reported measles annual incidence, from 146 to 33 per million population, and a 78% decline in estimated annual measles deaths, from 562,400 to 122,000. Compared with a scenario of no vaccination, an estimated 13.8 million deaths were prevented by measles vaccination during 2000–2012. Achieving the 2015 targets and elimination goals will require countries and their partners to raise the visibility of measles elimination and make substantial and sustained additional investments in strengthening health systems.

Immunization Activities

WHO and the United Nations Children's Fund (UNICEF) use data from administrative records and surveys reported annually by member states to estimate MCV1 coverage among children aged 1 year.¶ Since 2003, member states also have reported the number of districts with ≥80% MCV1 coverage. Estimated MCV1 coverage increased globally from 73% to 84% during 2000–2009, then remained at 84% through 2012 (Table 1). The number of member states with ≥90% MCV1 coverage increased from 83 (43%) in 2000 to 128 (66%) in 2012. The number of member states with ≥90% MCV1 coverage nationally that also had ≥80% MCV1 coverage in all districts increased from 40 (38%) of 104 in 2003 to 58 (45%) of 128 in 2012. Of the estimated 21.2 million infants who did not receive MCV1 in 2012, approximately 13.5 million (64%) were in six member states: India (6.4 million), Nigeria (3.8 million), Ethiopia (1.0 million), Indonesia (0.9 million), Pakistan (0.7 million), and the Democratic Republic of the Congo (0.7 million).

During 2000–2012, the number of member states providing the second dose of measles vaccine (MCV2) through routine immunization services increased from 96 (50%) to 145 (75%). During 2012, approximately 145 million children received MCV during SIAs conducted in 33 member states. MCV coverage ≥95% after SIAs was reported by 18 (55%) member states, and 12 (36%) member states conducted coverage surveys to validate coverage. During measles SIAs, 20 (61%) member states included one or more additional child health interventions; 18 (55%) included oral poliovirus vaccination (Table 2).

Disease Incidence

Effective measles surveillance includes case-based surveillance with laboratory testing to confirm cases. During 2004–2012,** the number of member states using case-based surveillance increased from 120 (62%) to 187 (96%).†† During 2000–2012, the number of member states with access to standardized quality-controlled testing through the WHO Measles and Rubella Laboratory Network increased from 71 (37%) to 191 (98%).§§

* Whereas the coverage milestone is to be met by every member state, the incidence and mortality reduction milestones are to be met globally.

† The Decade of Vaccines is a collaboration between WHO, UNICEF, the Bill and Melinda Gates Foundation, the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunization), the U.S. National Institute of Allergy and Infectious Diseases, the African Leaders Malaria Alliance, and others to extend, by 2020 and beyond, the full benefit of immunization to all persons. Additional information available at http://apps.who.int/gb/ebwha/pdf_files/wha65/a65_22-en.pdf.

§ SIAs generally are carried out using two target age ranges. An initial, nationwide catch-up SIA targets all children aged 9 months–14 years, with the goal of eliminating susceptibility to measles in the general population. Periodic follow-up SIAs then target all children born since the last SIA. Follow-up SIAs generally are conducted nationwide every 2–4 years and target children aged 9–59 months; their goal is to eliminate any measles susceptibility that has developed in recent birth cohorts and to protect children who did not respond to the first measles vaccination.

¶ Among children aged 1 year or, if MCV1 is given at age ≥1 year, among children aged 24 months. WHO/UNICEF estimates of national immunization coverage are available at http://www.who.int/immunization_monitoring/routine/immunization_coverage/en/index4.htm.

** Data for years before 2004 were not available.

†† Member states without case-based measles surveillance in 2012 include Djibouti, India, Mauritius, Seychelles, Sao Tome and Principe, Somalia, and South Sudan.

§§ Member states without access to standardized quality-controlled testing by the WHO Measles and Rubella Laboratory Network in 2012 included Cape Verde, Sao Tome and Principe, and Seychelles.

TABLE 1. Estimates of coverage with the first dose of measles-containing vaccine (MCV1) administered through routine immunization services among children aged 1 year, reported measles cases and incidence, and estimated measles mortality, by World Health Organization (WHO) region, 2000 and 2012

	2000						
WHO region	% coverage with MCV1*	% member states with coverage ≥90%	No. of reported measles cases†	Measles incidence (cases per million population)§¶	% member states with incidence <5 per million	Estimated measles deaths	
						No.	(95% CI)
African	53	9	520,102	841	8	354,900	(225,000–636,000)
Americas	93	63	1,755	2.1	89	<100	—
Eastern Mediterranean	72	57	38,592	90	17	53,900	(32,500-85,700)
European	91	60	37,421	50	48	300	(100–1,200)
South-East Asia	65	30	78,558	51	0	141,200	(105,800–186,400)
South-East Asia (excluding India)	*77*	—	*39,723*	*80*	*0*	*84,300*	*(67,800–103,200)*
India	59	—	38,835	37	0	56,900	(38,000–83,200)
Western Pacific	85	41	177,052	105	30	12,100	(6,800–48,500)
Total	**73**	**43**	**853,480**	**146**	**38**	**562,400**	**(370,200–957,900)**

	2012										
WHO region	% coverage with MCV1*	% member states with coverage ≥90%	No. of reported measles cases†	% decline from 2000	Measles incidence (cases per million population)§¶	% decline from 2000	% member states with incidence <5 per million	Estimated measles deaths		% mortality reduction 2000 to 2012	% total measles deaths in 2012
								No.	(95% CI)		
African	73	33	106,052	80	125	85	40	41,400	(13,900–148,500)	88	**34**
Americas	94	83	143	92	0.1	93	100	<100	—	—	**0**
Eastern Mediterranean	83	55	35,788	7	62	32	43	25,800	(17,500–42,200)	52	**21**
European	94	87	27,030	28	37	26	71	100	(0–1,300)	64	**0**
South-East Asia	78	55	46,945	40	26	50	36	52,700	(34,400–79,100)	63	**43**
South-East Asia (excluding India)	*88*	—	*28,277*	*29*	*47*	*41*	*40*	*36,200*	*(25,600–48,800)*	*57*	***30***
India	74	—	18,668	52	15	59	0	16,500	(8,800–30,300)	71	**14**
Western Pacific	97	74	10,764	94	6	94	70	2,000	(100–37,400)	84	**2**
Total	**84**	**66**	**226,722**	**73**	**33**	**77**	**64**	**122,000**	**(65,900–308,500)**	**78**	**100**

Abbreviation: CI = confidence interval.

* Based on WHO/UNICEF estimates of national immunization coverage, available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragemcv.html.

† Based on WHO reported measles case data, available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html. Data for Region of the Americas available at http://ais.paho.org/phip/viz/im_vaccinepreventablediseases.asp.

§ Based on United Nations population data, available at http://esa.un.org/unpd/wpp/index.htm.

¶ Any country not reporting data on measles cases for that year was removed from both the numerator and denominator.

During 2000–2012, the number of measles cases reported worldwide each year¶¶ decreased 73%, from 853,480 to a historic low of 226,722, and measles incidence decreased 77%, from 146 to 33 cases per million population per year (Table 1). The decrease in 2012 occurred in all regions and followed 3 years of increasing numbers of cases. During 2000–2012, the Region of the Americas (AMR) maintained measles incidence at <5 cases per million; in 2012, reported incidence in the Western Pacific Region (WPR) was six cases per million, a historic low.

The percentage of reporting member states with <5 cases per million increased from 55% (104 of 188) in 2011 to 64% (119 of 187) in 2012. During 2012, large measles outbreaks were reported by the Democratic Republic of the Congo (72,029 cases), India (18,668), Indonesia (15,489), Ukraine (12,746), Somalia (9,983), Sudan (8,523), Pakistan (8,046), and Romania (7,450). China reported 6,183 cases, a historic low after a steady annual decrease from 38,159 cases in 2010.

Genotyping results from isolates from persons with measles were reported from 49 (39%) of the 125 member states reporting measles cases in 2012. Six measles genotypes were identified; the predominant genotypes were B3 in the African Region (AFR) and the Eastern Mediterranean Region (EMR); D4 in the European Region (EUR); H1, D8, and D9 in SEAR and WPR; with one G3 reported from one outbreak in WPR.***

¶¶ Data available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html.

*** Data available from the Measles Nucleotide Surveillance (MeaNS) database at http://www.hpa-bioinformatics.org.uk/Measles/Public/Web_Front/main.php.

TABLE 2. Measles supplementary immunization activities (SIAs)* and the delivery of other child health interventions, by World Health Organization (WHO) region and member state, 2012

WHO region / Member state	Age group targeted	Extent of SIA	Children reached in targeted age group		Other interventions
			No.	(%)†	
African					
Burundi	6–59 mos	National	1,459,304	(103)	Vitamin A, anthelminthics
Cameroon	9–59 mos	National	3,570,032	(102)	Vitamin A
Chad	6–59 mos	National	2,270,772	(112)	OPV
Democratic Republic of the Congo	9–59 mos	Subnational	6,577,639	(102)	OPV
Eritrea	9–47 mos	National	277,928	(75)	OPV, vitamin A
Gabon	9–59 mos	National	168,749	(67)	Vitamin A, anthelminthics
Guinea	9–59 mos	National	2,098,829	(95)	OPV
Guinea Bissau	9–59 mos	National	220,263	(80)	Vitamin A, anthelminthics
Kenya	9–59 mos	National	5,995,049	(107)	OPV, vitamin A
Namibia	9 mos–14 yrs	National	885,259	(91)	OPV, vitamin A
Niger	9 mos–14 yrs	National	7,736,066	(102)	Vitamin A, anthelminthics
Sao Tome and Principe	9–59 mos	National	22,528	(105)	
Sierra Leone	9–59 mos	National	1,179,605	(102)	Vitamin A, anthelminthics
Uganda	9–59 mos	National	6,283,441	(100)	OPV, vitamin A, anthelminthics
Zambia	9 mos–14 yrs	National	7,503,515	(116)	OPV and tetanus toxoid vaccine, vitamin A
Zimbabwe	6–59 mos	National	1,613,437	(103)	OPV, vitamin A
Americas					
Haiti	9 mos–9yrs	National	2,963,911	(118)	OPV and rubella vaccine, vitamin A, anthelminthics
Honduras	1–4 yrs	National	696,712	(82)	OPV, mumps and rubella vaccines, vitamin A
Nicaragua	1–4 yrs	National	559,985	(107)	Rubella vaccine, vitamin A, anthelminthics
Eastern Mediterranean					
Afghanistan	9 mos–10 yrs	National	11,520,650	(103)	OPV
Djibouti	9–59 mos	National	96,064	(95)	
Iraq	9–60 mos	National	4,733,889	(94)	Rubella vaccine
Pakistan	9 mos–9 yrs	Rollover (national)§	1,954,175	(102)	OPV
Somalia	6–59 mos	Subnational children health days and SIAs in newly accessible areas	1,381,272	(90)	OPV and tetanus toxoid vaccine, vitamin A, anthelminthics
South Sudan	6– 59 mos	National	1,708,418	(90)	OPV, vitamin A
Syria	12–59 mos	National	768,086	(60)	Mumps and rubella vaccines
Yemen	6 mos–10 yrs	National	7,984,779	(93)	OPV, vitamin A
South-East Asia					
India	9 mos–10 yrs	Rollover (national)§	45,189,988	(84)	
Myanmar	9–59 mos	National	6,267,535	(97)	
Nepal	6 mos–14 yrs	National	9,685,099	(101)	Rubella vaccine
Western Pacific					
Mongolia	3–14 yrs	National	522,429	(93)	Rubella vaccine
Papua New Guinea	6–35 mos	National	552,872	(88)	OPV and tetanus toxoid vaccine, vitamin A, anthelminthics
Solomon Islands	12–59 mos	National	67,832	(101)	Rubella vaccine
Total			**144,516,112**		

Abbreviation: OPV = oral poliovirus vaccine.

* SIAs generally are carried out using two approaches. An initial nationwide catch-up SIA targets all children aged 9 months to 14 years; it has the goal of eliminating susceptibility to measles in the general population. Periodic follow-up SIAs then target all children born since the last SIA. Follow-up SIAs generally are conducted nationwide every 2–4 years and generally target children aged 9–59 months; their goal is to eliminate any measles susceptibility that has developed in recent birth cohorts and to protect children who did not respond to the first measles vaccination. The exact age range for follow-up SIAs depends on the age-specific incidence of measles, coverage with 1 dose of measles-containing vaccine, and the time since the last SIA.

† Values >100% indicate that the intervention reached more persons than the estimated target population.

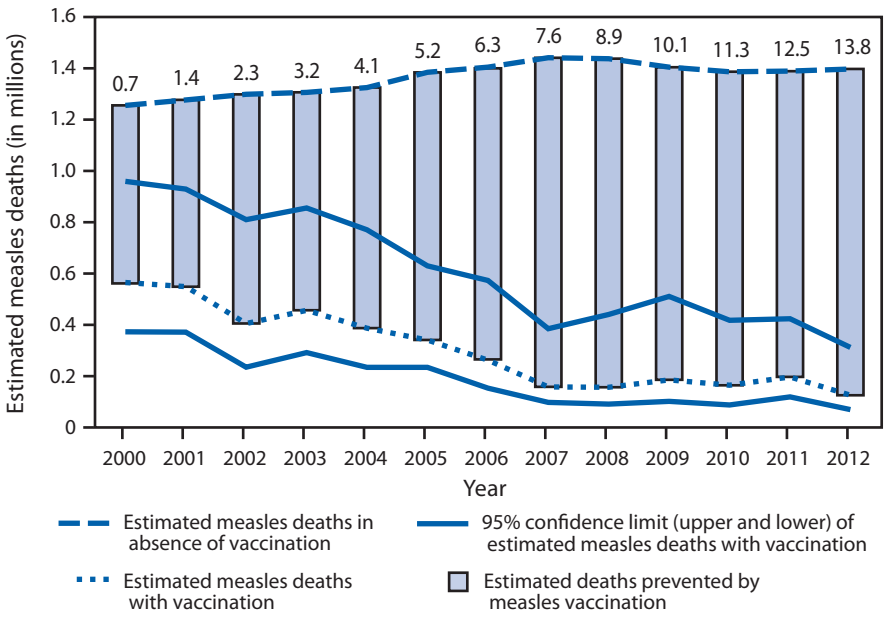
§ Rollover national campaigns started the previous year or will continue into the next year.

Mortality Estimates

In response to the lack of reliable data on the number of measles deaths from many member states, WHO has developed a model to estimate mortality using numbers and age distribution of reported cases, routine and SIA MCV coverage, and age-specific, country-specific case-fatality ratios (*3,4*). The model was refined in 2013 to reflect the impact of different SIA target age ranges and the population targeted in subnational

SIAs. These refinements, together with new 2012 measles vaccination coverage and case data for all member states, updated data for the period before 2012 for some member states, and updated population estimates (*5*), led to new mortality estimates for 2000–2012. During this period, estimated measles deaths decreased 78%, from 562,400 to 122,000; all regions had substantial reductions in estimated measles mortality, ranging from 52% in EMR to 88% in AFR (Table 1). Compared with a scenario of no vaccination against measles, an estimated 13.8 million deaths were prevented by measles vaccination during 2000–2012 (Figure).

FIGURE. Estimated measles mortality and measles deaths prevented worldwide, 2000–2012*



* Numbers over bars indicate cumulative estimated number of deaths prevented (in millions).

Regional Verification of Measles Elimination

By 2012, regional verification commissions were established in AMR, EUR, and WPR, and frameworks for documenting elimination were developed in AMR and EUR. While verifying elimination, member states in AMR uncovered weaknesses in surveillance and routine immunization programs, leading to a regional emergency plan of action to strengthen these programs.

Editorial Note

During 2000–2012, increasing routine MCV coverage worldwide and regular SIAs in member states lacking high coverage with 2 doses of MCV contributed to a 77% decrease in reported measles incidence and a 78% reduction in estimated measles mortality, reaching historic lows. During this period, measles vaccination prevented an estimated 13.8 million deaths. Measles elimination continues to be maintained in AMR (*6*), and WPR is approaching measles elimination (*7*). However, based on current trends and performance, the WHO Strategic Advisory Group of Experts (SAGE) concluded that the 2015 global targets and regional elimination targets in EUR, EMR, and AFR will not be achieved on time (*8*).

AFR, EMR, and SEAR, the regions with the largest number of infants not receiving MCV1 through routine immunization services in 2012, had large measles outbreaks during 2012 and had 98% of the estimated global measles mortality burden, highlighting the need to strengthen immunization systems. Globally 2012 might represent a temporary low in the normal cycle of measles incidence. Preventing a resurgence will require progress in reaching ≥95% of children with 2 MCV doses through routine immunization services and high-quality SIAs (*9*).

The findings in this report are subject to at least three limitations. First, MCV coverage estimates likely included errors resulting from inaccurate estimates of the size of target populations, inaccurate reporting of doses delivered, and inclusion of SIA doses given to children outside the target age group. Second, underestimation in surveillance data can occur because not all patients with measles seek care and not all of those who seek care are reported. These errors in coverage and surveillance data in turn affect the accuracy of the measles mortality model results. Finally, some member states also maintain multiple reporting systems for measles and might, like India, report aggregate, unconfirmed cases rather than case-based data.

To achieve measles elimination, member states should aim to fully implement measles control and elimination strategies described in GVAP and the 2012–2020 Global Measles and Rubella Strategic Plan (*10*) of the Measles and Rubella Initiative,††† which include achieving vaccination coverage ≥95% with 2 doses of MCV administered through routine immunization or SIAs and maintaining this coverage uniformly across all districts. For many member states now at <90% coverage nationally, reaching ≥95% coverage will require substantial and sustained additional investments of financial and human resources to strengthen health systems and achieve equitable access to immunization services. Further progress

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

What is already known on this topic?

During 2000–2011, global vaccination coverage with the first dose of measles-containing vaccine increased from 72% to 84%, approximately 225 million children received a second opportunity for measles immunization during measles supplemental immunization activities in 2011, and global reported measles cases decreased until 2008, then increased in 2010 and 2011. By 2011, about 45% of countries had not met the incidence target of <5 cases per million. As milestones toward eventual global measles eradication, the 2010 World Health Assembly endorsed a series of targets to be met by 2015.

What is added by this report?

In 2012, estimated global coverage with the first dose of measles-containing vaccine remained at the 2011 level of 84%, but the number of countries providing a second dose of measles-containing vaccine through routine immunization services increased from 96 (50%) in 2000 to 145 (75%) in 2012, and 144 million children were vaccinated against measles during vaccination campaigns. In 2012, annual reported measles incidence was 33 reported cases per million population, a decline of 77% from 146 cases per million population in 2000, and estimated measles deaths decreased 78%, from 562,400 to 122,000. An estimated 13.8 million deaths were prevented by measles vaccination during 2000–2012.

What are the implications for public health practice?

Although measles incidence decreased during 2011–2012, the World Health Organization's African, Eastern Mediterranean, and European regions are not on track to achieving their elimination targets. To accelerate progress toward achieving these regional measles elimination targets national governments and partners are urged to give these efforts high priority and adequate resources to achieve their commonly agreed upon goals, and in so doing reach the targets set by the Global Vaccine Action Plan.

toward achieving the 2015 global measles control targets and regional measles elimination targets will also require member states and partners to increase the visibility of measles elimination activities and make the needed investments.

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Advisory Committee on Immunization Practices Recommended Immunization Schedules for Persons Aged 0 Through 18 Years — United States, 2014

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

Each year, the Advisory Committee on Immunization Practices (ACIP) reviews the recommended immunization schedules for persons aged 0 through 18 years to ensure that the schedules reflect current recommendations for Food and Drug Administration–licensed vaccines. In October 2013, ACIP approved the recommended immunization schedules for persons aged 0 through 18 years for 2014, which include several changes from the 2013 immunization schedules.

For 2014, the figures, footnotes, and tables are not being published in MMWR; instead, a link to the CDC immunization schedule website is provided (http://www.cdc.gov/vaccines/schedules). This provides readers electronic access to the most current version of the schedules and footnotes on the CDC website. Health-care providers are advised to use both schedules and the combined footnotes together. Printable versions of the 2014 immunization schedules for persons aged 0 through 18 years also are available at the website in several formats, including portrait, landscape, and pocket-sized versions. Ordering instructions for laminated versions also are available at the website. "Parent-friendly" child and adolescent schedules are available at http://www.cdc.gov/vaccines/schedules/easy-to-read/index.html.

For further guidance on use of each vaccine included in the schedules, including contraindications and precautions to use of a vaccine, health-care providers are referred to the respective ACIP vaccine recommendations at http://www.cdc.gov/vaccines/hcp/acip-recs. In addition, changes in recommendations for specific vaccines might occur between annual updates to the childhood/adolescent immunization schedules.

These immunization schedules are approved by ACIP (http://www.cdc.gov/vaccines/acip/index.html), the American Academy of Pediatrics (http://www.aap.org), the American Academy of Family Physicians (http://www.aafp.org), and the American College of Obstetricians and Gynecologists (http://www.acog.org).

CDC's National Center for Immunization and Respiratory Diseases (NCIRD) maintains the most current immunization schedules on the Vaccines and Immunizations pages of CDC's website (http://www.cdc.gov/vaccines/schedules). If errors or omissions are discovered, CDC posts revised versions on those web pages. CDC encourages organizations that previously have relied on copying the schedules on their websites instead to use content syndication to consistently display current schedules. This is a more reliable and accurate method and ensures that the most current and accurate immunization schedules are on each organization's website.

Use of content syndication requires a one-time step that assures that an organization's website displays current schedules as soon as they are published or revised. Instructions for the syndication code are available at http://www.cdc.gov/vaccines/schedules/syndicate.html. CDC offers technical assistance for implementing this form of content syndication. Assistance from an NCIRD web team staff member is available by completing the e-mail form on the NCIRD web

Recommendations for routine use of vaccines in children, adolescents, and adults are developed by the Advisory Committee on Immunization Practices (ACIP). ACIP is chartered as a federal advisory committee to provide expert external advice and guidance to the Director of the Centers for Disease Control and Prevention (CDC) on use of vaccines and related agents for the control of vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in children and adolescents are harmonized to the greatest extent possible with recommendations made by the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), and the American College of Obstetrics and Gynecology (ACOG). Recommendations for routine use of vaccines in adults are harmonized with recommendations of AAFP, ACOG, and the American College of Physicians (ACP). ACIP recommendations adopted by the CDC Director become agency guidelines on the date published in the Morbidity and Mortality Weekly Report *(*MMWR*). Additional information regarding ACIP is available at http://www.cdc.gov/vaccines/acip.*

* Advisory Committee on Immunization Practices member rosters are available at http://www.cdc.gov/vaccines/acip/committee/members-archive.html.

support page (http://www.cdc.gov/vaccines/about/contact/web_problem_form.htm).

Changes to the previous schedules[†] include the following:

- Several new references were added, including the 2014 adult immunization schedule (http://www.cdc.gov/vaccines/schedules) for vaccination recommendations for persons aged ≥19 years. Recommendations for persons who have been vaccinated before the minimum age/interval between doses of vaccine in a series also were added.
- Figure 1, "Recommended Immunization Schedule for Persons Aged 0 through 18 Years":
  - Legend for the meningococcal conjugate vaccine row updated to reflect recommendation for use of MenACWY–CRM vaccine as early as age 2 months.
  - Pages 4 through 6 contain combined footnotes for each vaccine related to routine vaccination, catch-up vaccination,[§] and vaccination of persons with high-risk medical conditions or under special circumstances.
- Standardized formatting used for footnotes for each vaccine to reflect the number of vaccine doses in a particular series.
  - Meningococcal conjugate vaccine footnotes updated to reflect recent recommendations for use of MCV4-CRM in high-risk persons aged 2 months and older.
  - Footnotes organized to reflect vaccine recommendations for each high-risk condition.
  - Influenza vaccine footnotes updated to provide guidance for dosing for children aged 6 months through 8 years for the 2013–14 and 2014–15 seasons.
  - Pneumococcal vaccine footnotes updated to provide guidance for vaccination of persons with high-risk conditions.
  - Hepatitis A vaccine footnotes updated to provide guidance for unvaccinated persons who are at increased risk for infection.
- Figure 2, Catch-Up Immunization Schedule:
  - *Haemophilus influenzae* type b (Hib) conjugate vaccine, pneumococcal conjugate vaccine, and tetanus, diphtheria, and acellular pertussis (Tdap) vaccine catch-up schedules updated to provide more clarity.

[†] Past immunization schedules are available at http://www.cdc.gov/vaccines/schedules/past.html.

[§] For persons aged 4 months through 18 years who start late or who are more than 1 month behind in receiving recommended vaccinations.

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Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older — United States, 2014

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

Vaccines are recommended for adults on the basis of their age, prior vaccinations, health conditions, lifestyle, occupation, and travel. Reasons for current low levels of vaccination coverage for adult vaccines are multifactorial and include limited awareness among the public about vaccines for adults and gaps in incorporation of regular assessments of vaccine needs and vaccination into routine medical care (*1–4*). Updated standards for immunization of adults were approved by the National Vaccine Advisory Committee (NVAC) in September 2013 (*5*). These standards acknowledge the current low levels of vaccination coverage among adults and the role that all health-care providers, including those who do not offer all recommended adult vaccines in their practices, have in ensuring that their patients are up-to-date on recommended vaccines. NVAC recommends that providers assess vaccination needs for their patients at each visit, recommend needed vaccines, and then, ideally, offer the vaccine or, if the provider does not stock the needed vaccines, refer the patient to a provider who does vaccinate. Vaccinating providers should also ensure that patients and their referring health-care providers have documentation of the vaccination.

A recommendation by a patient's health-care provider for needed vaccines is a strong predictor of patients receiving recommended vaccines (*6,7*). Other interventions to improve vaccination rates have been summarized in the *Community Guide* (http://www.thecommunityguide.org/vaccines/index.html) and include systems changes, such as routine screening and offering of vaccines and implementation of reminder/recall systems (*8*).

Because many adult patients might consult more than one health-care provider and also might be vaccinated at the workplace, pharmacy, or other location, documentation of vaccinations in immunization information systems (IIS) (i.e., vaccine registries) is important to ensure that a patient's complete vaccination history is available to all of his/her providers. In addition, some vaccines require more than 1 dose with specified time intervals between doses (e.g., hepatitis B vaccine 3-dose series) or are recommended for certain adult populations only if adults were not vaccinated as children (e.g., measles-mumps-rubella [MMR] vaccine). IIS are managed by state or city immunization programs; contact information about these systems is available at http://www.cdc.gov/vaccines/programs/iis/contacts-registry-staff.html.

The Advisory Committee on Immunization Practices (ACIP) annually reviews and updates the *Recommended Immunization Schedule for Adults Aged 19 Years or Older*. This schedule provides a brief summary of ACIP recommendations for the use of vaccines routinely recommended for adults in the form of two figures, footnotes for each vaccine, and a table that includes primary contraindications and precautions.

In October 2013, ACIP approved the *Recommended Immunization Schedule for Adults Aged 19 Years or Older* for 2014. This schedule was also reviewed and approved by the American Academy of Family Physicians, the American College of Physicians, the American College of Obstetricians and Gynecologists, and the American College of Nurse-Midwives. The primary updates for the 2014 schedule include adding

Recommendations for routine use of vaccines in children, adolescents, and adults are developed by the Advisory Committee on Immunization Practices (ACIP). ACIP is chartered as a federal advisory committee to provide expert external advice and guidance to the Director of the Centers for Disease Control and Prevention (CDC) on use of vaccines and related agents for the control of vaccine-preventable diseases in the civilian population of the United States. Recommendations for routine use of vaccines in children and adolescents are harmonized to the greatest extent possible with recommendations made by the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), and the American College of Obstetrics and Gynecology (ACOG). Recommendations for routine use of vaccines in adults are harmonized with recommendations of AAFP, ACOG, and the American College of Physicians (ACP). ACIP recommendations adopted by the CDC Director become agency guidelines on the date published in the Morbidity and Mortality Weekly Report (MMWR). *Additional information regarding ACIP is available at http://www.cdc.gov/vaccines/acip.*

* Current and past ACIP member rosters are available at http://www.cdc.gov/vaccines/acip/committee/members-archive.html.

Haemophilus influenzae type b (Hib) vaccine to the figures and updating information in the footnote about persons for whom Hib vaccine is recommended; adding information to the influenza vaccine footnote and contraindications table regarding the newly licensed recombinant influenza vaccine (RIV) and information about the use of RIV and inactivated influenza vaccine (IIV) among persons with egg allergies; moving the footnote for pneumococcal conjugate vaccine (PCV13) recommendations before the pneumococcal polysaccharide vaccine (PPSV23) recommendations because PCV13 should be administered first among persons for whom both vaccines are recommended; and clarifying information about the timing of the second and third doses of human papillomavirus (HPV) vaccine, use of meningococcal vaccines among adults, and recommendations for tetanus, diphtheria, acellular pertussis (Tdap) and tetanus and diphtheria (Td) vaccines (*9*–*10*).

Because of space limitations, many details of the full ACIP recommendations for each vaccine are not included in the schedule, and interested health-care providers should refer to the full ACIP recommendations. In addition, changes in recommendations for specific vaccines might occur between annual updates to the adult immunization schedule. ACIP recommendations for specific vaccines are available at http://www.cdc.gov/vaccines/hcp/acip-recs/index.html. Information on reporting vaccine-related adverse events is available online at http://www.vaers.hhs.gov or by telephone at 800-822-7967.

The full 2014 schedule is published in the *Annals of Internal Medicine* (*11*). This year, the figures, footnotes, and tables are not being published in *MMWR*, but will be posted and maintained on the CDC website at http://www.cdc.gov/vaccines/schedules to facilitate updating the schedule during the year, if needed. If errors or omissions are detected after publication of the pediatric or adult immunization schedules, CDC posts revised versions. CDC encourages organizations that have previously relied on copying and posting portable document format (PDF) files of the schedules to their websites to instead use "content syndication" to ensure that current and accurate immunization schedule information appears on each organization's website. This one-time step ensures that websites display current yearly schedules as soon as they are published or revised. Instructions for copying and placing syndication code are available at http://www.cdc.gov/vaccines/schedules/syndicate.html. CDC offers technical assistance for organizations implementing this form of content syndication. For assistance, readers can complete the e-mail form on the CDC's National Center for Immunization and Respiratory Diseases (NCIRD) web support page (http://www.cdc.gov/vaccines/about/contact/web_problem_form.htm), and an NCIRD web team member will contact them to provide assistance.

Changes for 2014

Footnotes

- Hib vaccine recommendations were updated. The vaccine is recommended for certain adults at increased risk for Hib who have not received the Hib vaccine before. Adults who have had a successful hematopoietic stem cell transplant are recommended to receive a 3-dose series of Hib vaccine 6–12 months after transplant regardless of prior Hib vaccination. Prior Hib vaccine guidance recommended that Hib vaccination of persons infected with human immunodeficiency (HIV) be considered, but updated guidance no longer recommends Hib vaccination of previously unvaccinated adults with HIV infection because their risk for Hib infection is low.
- Information on RIV and the use of RIV and IIV among egg-allergic patients was added to the footnote and indicates that RIV or IIV can be used among persons with hives-only allergy to eggs. RIV contains no egg protein and can be used among persons aged 18 through 49 years who have egg allergy of any severity.
- The Td/Tdap vaccine footnote was edited to harmonize language used in the pediatric immunization schedule. A single dose of Tdap vaccine is recommended for previously unvaccinated persons aged 11 years or older, and a Td booster should be administered every 10 years thereafter. Pregnant women continue to be recommended to receive 1 dose of Tdap vaccine during each pregnancy, preferably during 27–36 weeks' gestation, regardless of the interval since prior dose of Tdap or Td vaccine.
- Information was added to the HPV footnote to clarify the timing between the second and third doses and to harmonize language between the pediatric and adult immunization schedules; no changes in recommendations were made.
- The HPV vaccine and the zoster vaccine footnotes were simplified, with removal of the bullet regarding health-care personnel (HCP). Being a health-care worker is not a specific indication for these vaccines, but they should be given to HCP and others who meet age and other indications for these vaccines. Information on HCP vaccination for all vaccines is available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm.
- Because PCV13 is recommended to be administered before PPSV23 among persons for whom both vaccines are recommended, the PCV13 footnote now precedes the PPSV23 footnote and includes wording to remind providers of the appropriate order of these vaccines when both are indicated.

- The meningococcal vaccine footnote was edited to clarify which persons need either 1 or 2 doses of vaccine and to provide greater clarity regarding which patients should receive the meningococcal conjugate versus the meningococcal polysaccharide quadrivalent vaccines.
- No changes or minor clarifications were made to the MMR, hepatitis A, or hepatitis B vaccine footnotes; no changes in recommendations were made.

Figures

- For Figures 1 and 2, a row for Hib vaccine was added, and the PCV13 vaccine row was moved before PPSV23 as a reminder that PCV13 vaccines should be administered first among patients for whom both vaccines are recommended.

Contraindications and precautions table

- The contraindications and precautions table was updated to include information on RIV, an influenza vaccine that contains no egg protein and is indicated for persons aged 18 through 49 years.
- The Hib vaccine was added to the table.

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ACIP Adult Immunization Work Group

Vital Signs: Restraint Use and Motor Vehicle Occupant Death Rates Among Children Aged 0–12 Years — United States, 2002–2011

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On February 4, 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 among children in the United States. Age- and size-appropriate child restraint use is the most effective method for reducing these deaths.

Methods: CDC analyzed 2002–2011 data from the Fatality Analysis Reporting System to determine the number and rate of motor-vehicle occupant deaths, and the proportion of unrestrained child deaths among children aged <1 year, 1–3 years , 4–7 years, 8–12 years, and for all children aged 0–12 years. Age group–specific death rates and proportions of unrestrained child motor vehicle deaths for 2009–2010 were further stratified by race/ethnicity.

Results: Motor vehicle occupant death rates for children declined significantly from 2002 to 2011. However, one third (33%) of children who died in 2011 were unrestrained. Compared with white children for 2009–2010, black children had significantly higher death rates, and black and Hispanic children both had significantly higher proportions of unrestrained child deaths.

Conclusions: Motor vehicle occupant deaths among children in the United States have declined in the past decade, but more deaths could be prevented if restraints were always used.

Implications for Public Health: Effective interventions, including child passenger restraint laws (with child safety seat/booster seat coverage through at least age 8 years) and child safety seat distribution plus education programs, can increase restraint use and reduce child motor vehicle deaths.

Introduction

Motor vehicle crashes are a leading cause of death among children in the United States (*1*). Child safety seat (CSS) use reduces the risk for death to infants (aged <1 year) by 71%; and to toddlers (aged 1–4 years) by 54% in passenger vehicles (*2,3*). Booster seat use reduces the risk for serious injury by 45% for children aged 4–8 years when compared with seat belt use alone (*4*). For older children and adults, seat belt use reduces the risk for death and serious injury by approximately half (*5*). Based on this evidence, CDC recommends using age- and size-appropriate child restraints (including CSS and booster seats) in the back seat until adult seat belts fit properly (i.e., when the lap belt lays across the upper thighs, not the stomach; and the shoulder belt lays across the shoulder and chest, not the neck or face), which normally occurs after a child is at least age 8 years or ≥57 inches (145 cm) tall (*6*). The Community Preventive Services Task Force recommends CSS laws and CSS distribution plus education programs based on strong evidence of their effectiveness for increasing restraint use and decreasing injuries and deaths to child passengers (*7*). Distribution plus education programs are also recommended in a more recent review for increasing restraint use (*8*). The purpose of this study was to explore data over the past decade on child motor vehicle occupant deaths, determine the proportion of unrestrained child deaths, and explore differences by age, sex, and race/ethnicity.

Methods

For this study, CDC used Fatality Analysis Reporting System data, which include motor vehicle crashes that occur on public roads in the United States in which at least one vehicle occupant or nonoccupant (pedestrian, bicyclist, etc.) involved in the crash dies within 30 days. Deaths among motor vehicle occupants aged 0–12 years in passenger vehicles (i.e., passenger cars, pickup trucks, vans, and sport utility vehicles) during 2002–2011 were included in this study. Analyses were conducted among all children aged 0–12 years and were stratified into the following four age groups: <1 year, 1–3 years, 4–7 years, and 8–12 years; coinciding with the recommended ages for the various types of child restraints during the study period.

Population counts were obtained from the U.S. Census Bureau for the same age groups and years.

Annual motor vehicle occupant death rates per 100,000 population were calculated for 2002–2011. The percent changes in death rates were calculated over the past decade. Age group–specific death rates for 2009–2010 (the most recent years of finalized race/ethnicity data available at the time of study analyses) were further stratified by sex and race/ethnicity. The proportion of motor vehicle deaths that involved children who were unrestrained (hereafter referred to as the proportion of unrestrained child deaths) were calculated for 2002–2011 by dividing the number of unrestrained deaths by all child motor vehicle occupant deaths, including deaths for which restraint use status was unknown.

Proportions of unrestrained child deaths were calculated by age group and race/ethnicity. The percentage changes in the proportions of unrestrained child deaths were calculated over the past decade. To account for small numbers, 2 years of data were combined at the beginning and end of the decade (2002–2003 and 2009–2010) for race/ethnicity percent change calculations. Race/ethnicity was divided into five mutually exclusive categories: non-Hispanic whites, blacks, American Indians/Alaska Natives (AI/AN), Asian/Pacific Islanders (A/PI), and Hispanics of all races. However, because AI/ANs and A/PIs had <20 deaths in each age group, they were not included in the racial stratification analyses.

Death rate standard errors were calculated by dividing the death rate by the square root of the number of deaths (*9*). Normal approximation was used to calculate 95% confidence intervals for rates when the number of deaths was ≥100 and Poisson approximation was used when the number of deaths was <100 (*9*). Poisson distribution was used to calculate standard errors for proportions of unrestrained child deaths and U.S. Census Bureau methods were used to calculate 95% confidence intervals for percentage changes (*10*).

Results

During 2002–2011, a total of 9,182 children aged 0–12 years died in motor vehicle crashes in the United States. During this period, motor vehicle death rates among children aged 0–12 years decreased 43%, from 2.2 deaths per 100,000 population in 2002 to 1.2 in 2011 (Figure 1). By age group, motor vehicle death rates decreased significantly among children aged <1 year by 45% (2.7 to 1.5 per 100,000 population), 1–3 years by 44% (2.3 to 1.3 per 100,000 population), 4–7 years by 43% (2.1 to 1.2 per 100,000 population), and 8–12 years by 41% (2.0 to 1.2 per 100,000 population). Also during 2002–2011, the proportion of unrestrained child deaths decreased significantly for children aged 1–3 years (by 18%), aged 4–7 years (by 39%), and aged 0–12 years (by 24%) (Figure 2). However, in 2011, 33% of children aged 0–12 years who died as occupants of motor vehicles were unrestrained.

During 2009–2010, a total of 1,409 children aged 0–12 years died in motor vehicle crashes, a rate of 1.3 deaths per 100,000 population (Table). Death rates did not differ significantly by sex or age group, but did differ by race. Black children had significantly higher death rates than white children among those aged 1–3 years (2.0 versus 1.0 deaths per 100,000 population) and for all children aged 0–12 years combined (1.5 versus 1.0 deaths per 100,000 population). Additionally, black children had a significantly higher proportion of unrestrained child deaths compared with white children for those aged 1–3 years (47% versus 20%), 4–7 years (46% versus 26%), and for all children aged 0–12 years combined (45% versus 26%). Although no significant differences in motor vehicle death rates were found for Hispanic children compared with white children, Hispanic children had a significantly higher proportion of unrestrained child deaths compared with white children for those aged 4–7 years (50% versus 26%), 8–12 years (55% versus 33%), and 0–12 years (46% versus 26%).

From 2002–2003 to 2009–2010, the proportion of unrestrained child deaths decreased significantly among children aged 0–12 years, by 27% for whites, 16% for blacks, and 14% for Hispanics. Unrestrained child deaths also decreased, by 26% and 29% among white children aged 4–7 years and 8–12 years, respectively, by 28% among black children aged 4–7 years, and by 36% among Hispanic children aged 1–3 years.

Conclusions and Comment

This study found that child motor vehicle occupant death rates and the proportion of unrestrained child deaths decreased from 2002 to 2011. However, this study also found that >9,000 child motor vehicle occupants died during 2002–2011, and in 2011, still one third of children who died were unrestrained. During a motor vehicle crash, age- and size-appropriate restraint use is the most effective way to prevent injuries and deaths (*5*).

Compared with the relatively low proportion of unrestrained children seen in observational studies (*11,12*), the proportion of unrestrained child deaths is much higher. Among child passengers aged <1 year in 2011, for example, 2% were observed to be unrestrained (*11*), but 22% of children in that age group who died in motor vehicle crashes were unrestrained (proportion based on known restraint use) (*5*). The known effectiveness of restraints, coupled with the overrepresentation of unrestrained child deaths, demonstrates that more child motor vehicle deaths could be prevented through increased child restraint use. Based on National Highway Traffic Safety Administration calculations, an estimated 3,308 lives were saved by CSS use among children aged 0–4 years during 2002–2011. If CSSs were used in motor vehicles 100% of

FIGURE 1. Motor vehicle occupant deaths per 100,000 population for children aged 0–12 years, by age group and year — United States, 2002–2011

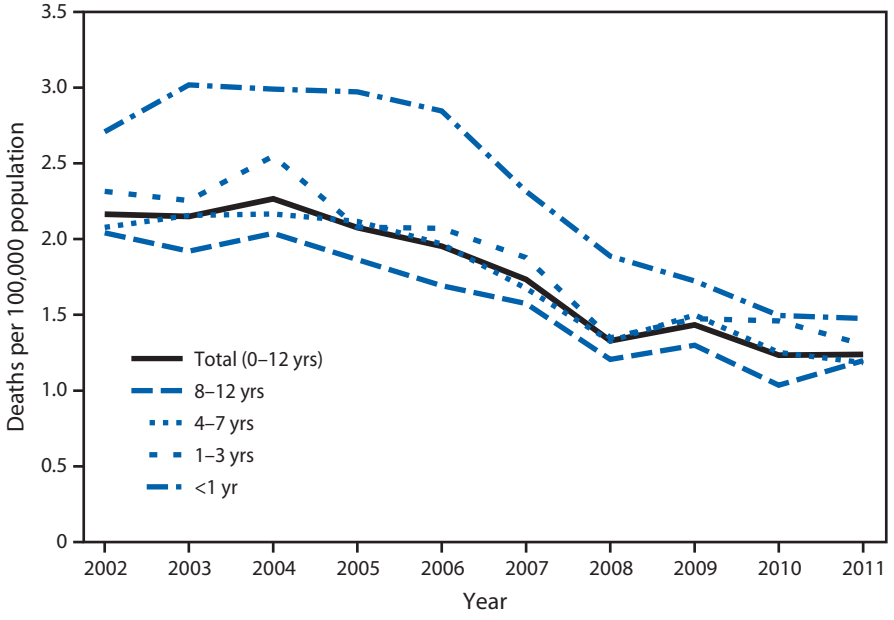
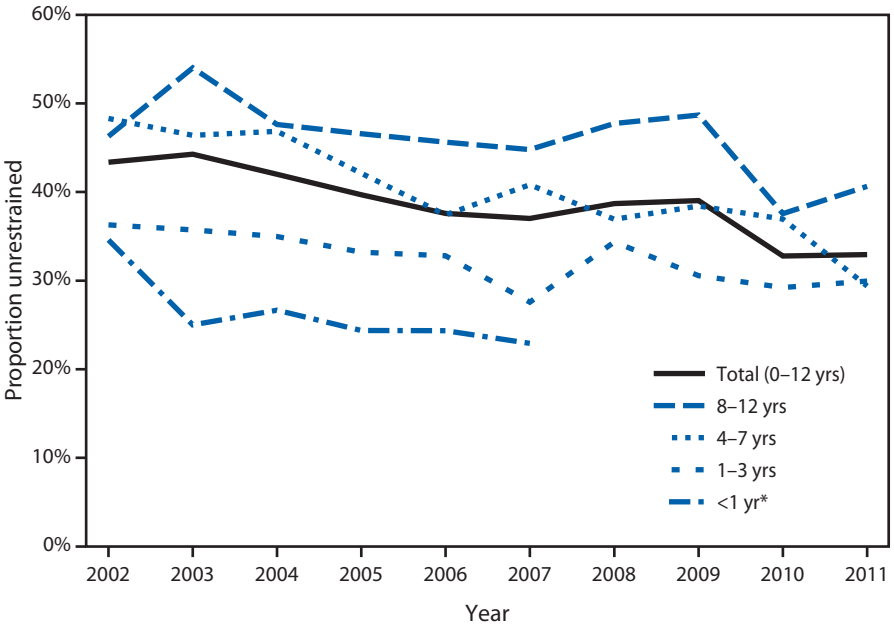


FIGURE 2. Proportion of unrestrained child motor vehicle deaths by age group and year — United States, 2002–2011



* 2008–2011 unrestrained deaths for children aged <1 years not shown because annual counts were <20.

the time for children aged 0–4 years, an additional 837 lives could have been saved (Marc Starnes, National Highway Traffic Safety Administration, personal communication, 2013) (*13*).

This study found that black children had the highest rates of motor vehicle occupant death compared with whites and Hispanics for children aged 1–3 years and aged 0–12 years combined. Racial/ethnic groups with the highest death rates also had higher proportions of unrestrained child deaths. A previous analysis of 2006 Fatality Analysis Reporting System data found that blacks had the highest proportion of unrestrained child deaths (52%), followed closely by Hispanics (51%) (proportion based on known restraint use) (*14*). The current study confirmed this, with blacks and Hispanics having a higher proportion of unrestrained child deaths than whites. In addition, this racial/ethnic difference in restraint use is found in observational studies and injury data, with black children more likely to be unrestrained than white children, and in self-reported data, with black and Hispanic children more likely to be unrestrained than white children (*15–17*). Socio-economic status might be a contributing factor to racial/ethnic differences. In a study of trauma patients, children insured with Medicaid were more likely to be black, and were less likely to be restrained than those with private insurance, suggesting that economically disadvantaged children might be less likely to be restrained (*17*).

Although observed restraint use increased from 88% in 2002 to 91% in 2011 among children aged 0–7 years (*12*), changes in observed restraint use varied by race/ethnicity. From 2006 to 2011, observed restraint use for white children aged 1–12 years increased or stayed the same (99% to 99% for ages 1–3 years, 93% to 96% for ages 4–7 years, and 85% to 91% for ages 8–12 years), while it decreased for Hispanic children of the same age (93% to 90% for ages 1–3 years, 92% to 79% for ages 4–7 years, and 84% to 83% for ages 8–12 years). During this period, observed restraint use for black children increased among those aged 1–7 years (89% to 90% for ages 1–3 years; 74% to 84% for ages 4–7 years), but decreased for among those aged 8–12 years (79% to 76%) (*11,18*). Further research is needed to better explore and understand these racial/ethnic differences.

Previous research found that child restraint use also differs by age, with the highest use among the youngest children (*11*). In a 2011 survey, children aged <1 year had observed restraint use of 98%; whereas, children aged 8–12 years had observed

TABLE. Motor vehicle occupant deaths per 100,000 population for children aged 0–12 years, by selected characteristics — United States, 2009–2010*

Age group (yrs)	Characteristic	No. of deaths	Deaths per 100,000 population	(95% CI)
<1	**Total**	**128**	**1.6**	**(1.3–1.9)**
	Sex			
	Male	75	1.8	(1.5–4.2)
	Female	52	1.3	(1.0–3.1)
	Race/Ethnicity			
	White, non-Hispanic	53	1.3	(0.9–2.9)
	Black, non-Hispanic	22	1.8	(1.1–4.5)
	Hispanic	27	1.3	(0.9–3.2)
1–3	**Total**	**358**	**1.5**	**(1.3–1.6)**
	Sex			
	Male	177	1.4	(1.2–1.6)
	Female	181	1.5	(1.3–1.7)
	Race/Ethnicity			
	White, non-Hispanic	132	1.0	(0.8–1.2)
	Black, non-Hispanic	76	2.0	(1.6–4.6)
	Hispanic	68	1.1	(0.9–2.5)
4–7	**Total**	**445**	**1.4**	**(1.2–1.5)**
	Sex			
	Male	228	1.4	(1.2–1.6)
	Female	217	1.4	(1.2–1.6)
	Race/Ethnicity			
	White, non-Hispanic	203	1.1	(1.0–1.3)
	Black, non-Hispanic	63	1.3	(1.0–3.0)
	Hispanic	84	1.1	(0.9–2.4)
8–12	**Total**	**478**	**1.2**	**(1.1–1.3)**
	Sex			
	Male	248	1.2	(1.0–1.3)
	Female	230	1.1	(1.0–1.3)
	Race/Ethnicity			
	White, non-Hispanic	207	0.9	(0.8–1.0)
	Black, non-Hispanic	77	1.2	(1.0–2.8)
	Hispanic	103	1.1	(0.9–1.4)
Total (0–12)	**Total**	**1,409**	**1.3**	**(1.3–1.4)**
	Sex			
	Male	728	1.3	(1.3–1.4)
	Female	680	1.3	(1.2–1.4)
	Race/Ethnicity			
	White, non-Hispanic	595	1.0	(0.9–1.1)
	Black, non-Hispanic	238	1.5	(1.3–1.7)
	Hispanic	282	1.1	(1.0–1.3)

Abbreviation: CI = confidence interval.
* The most recent 2 years for which race/ethnicity data have been finalized at the time of analysis.

restraint use of 88% (*11*). Similarly, previous research found that among child motor vehicle deaths aged 12 years and younger the proportion of unrestrained child deaths increased with age. Specifically, children aged <1 year had the lowest proportion (22%) of unrestrained child deaths, followed by children aged 1–4 years (32%) and aged 4–7 years (34%), based on known restraint use. Children aged 8–12 years had the highest proportion of unrestrained child deaths (45%), based on known restraint use (*5,19*). The current study confirmed this trend.

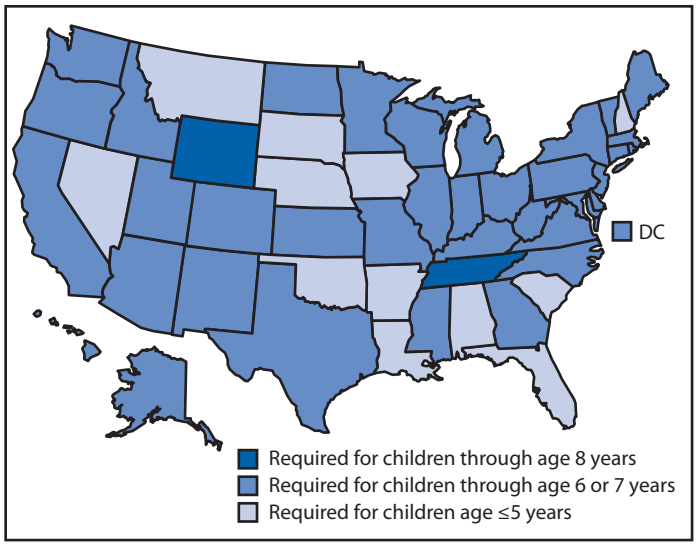
Effective interventions can increase restraint use among child motor vehicle occupants and prevent associated deaths and injuries. A Community Preventive Services Task Force systematic review found that CSS laws decrease deaths by a median of 35% and increase CSS use by a median of 13%, and CSS distribution plus education programs increase CSS possession by a median 51% and CSS use by a median of 23% (*7*). Based on these findings and strong evidence of effectiveness, the Task Force recommends both of these interventions to increase restraint use and reduce deaths. Increasing the required age for CSS/booster seat use in state child passenger restraint laws is also an effective way to increase restraint use among older children. A recent study of five states that increased the age requirement to 7 or 8 years for CSS/booster seat use found that the rate of children using CSS/booster seats increased nearly three times and the rate of children who sustained fatal or incapacitating injuries decreased by 17% (*20*).

Since 2002, a majority of states have increased the required age for CSS/booster seat use. However, in 2013, 12 states had child passenger restraint laws that required CSS/booster seat use by children aged ≤5 years; 36 states and the District of Columbia had laws requiring CSS/booster seats use by children through either age 6 or 7 years; and two states (Tennessee and Wyoming) had laws requiring CSS/booster seat use by children through at least age 8 years. As a result, in 2013, only 2% of children in the United States lived in states with a child passenger restraint law that required CSS/booster seat use by children through at least age 8 years (Figure 3).

Motor vehicle traffic death rates for children are higher in the United States than in other high income countries. In 2011, motor vehicle traffic death rates among children aged ≤14 years were below the U.S. rate (1.9 deaths per 100,000 population) in the United Kingdom (0.5), Sweden (0.6), Italy (0.7), Germany (0.8), Norway (0.9), and Canada (1.1). Notably, the child motor vehicle occupant death rate per 100,000 population in the United States is more than double that of 22 selected high-income European countries combined (1.9 versus 0.9 per 100,000 population, respectively) (*21*).

The findings in this report are subject to at least three limitations. First, Fatality Analysis Reporting System data are extracted from police reports of motor vehicle crashes and death certificates rather than self reports; therefore, some racial/ethnic misclassification is likely. Additionally, 13% of deaths (n = 182) from 2009–2010 had unknown race/ethnicity and were excluded from racial stratification analyses. Second, the reported proportions of unrestrained child deaths are likely underestimates; the proportion of deaths that had unknown restraint use ranged from a low of 7% in 2007 to a high of 29% in 2010. Finally, other factors, such as safer cars, safer child safety/booster seats, and the economy, might have contributed to the decrease in child motor vehicle occupant death rates. This study was not able to account for changes in these factors.

FIGURE 3. Child passenger restraint laws requiring use of child safety or booster seats, by age requirement and state* — United States, August 2013



* Only age was used to determine child passenger restraint law coverage. Some state also have specific height and/or weight requirements.

To reduce the number of child motor vehicle occupant deaths, parents and caregivers should ensure that children always travel in the back seat in age- and size-appropriate restraints as follows: rear-facing CSSs up to age 2 years; forward-facing CSSs up to at least age 5 years; booster seats through at least age 8 years and until seat belts fit properly; and adult seat belts, still in the back seat, until age 13 years. Passengers aged ≥13 years should use adult seat belts on every trip. Implementing interventions that are proven to increase child restraint use is an effective way to prevent child motor vehicle injuries and deaths. These interventions include child passenger restraint laws that require CSS/booster seat use in the back seat until a child is aged ≥8 years and CSS distribution plus education programs.

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Key Points

- Motor vehicle occupant death rates among children aged 0–12 years decreased by 43% from 2002 to 2011.
- Despite this decrease, one third of child motor-vehicle occupants (aged 0–12 years) who died in 2011 were unrestrained.
- Almost half of black (45%) and Hispanic (46%) children who died in crashes were unrestrained, compared with 26% of whites (2009–2010).
- In 2013, only two states had child passenger restraint laws that required child safety seat/booster seat use by children through at least age 8 years. Implementing effective interventions, such as increasing the state-required age for child safety seat/booster seat use in child passenger restraint laws and child safety seat distribution plus education programs, can reduce motor vehicle occupant deaths.
- Additional information is available at http://www.cdc.gov/vitalsigns.

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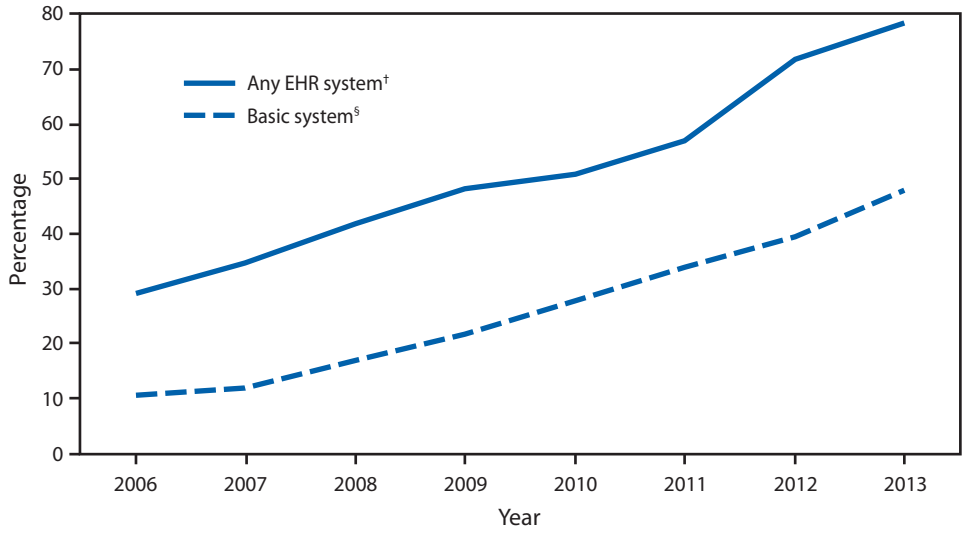
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Office-Based Physicians with Electronic Health Record (EHR) Systems — National Ambulatory Medical Care Survey,* United States, 2006–2013



* A sample survey of office-based physicians.
† A medical or health record system that is either all or partially electronic.
§ A system with the following functionalities: patient history and demographics, patient problem lists, physician clinical notes, comprehensive list of patient medications and allergies, computerized orders for prescriptions, and the ability to view laboratory and imaging results electronically.

During 2006–2013, the percentage of physicians using any EHR system increased 168%, from 29.2% in 2006 to 78.4% in 2013. Nearly half of physicians (48.1%) were using the more comprehensive "basic system" by 2013, up from 10.5% in 2006.

Source: Hsiao CJ , Hing E. Use and characteristics of electronic health record systems among office-based physician practices: United States, 2001–2013. NCHS data brief no. 143. Hyattsville, MD: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/nchs/data/databriefs/db143.pdf.

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