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Sexual Experience and Contraceptive Use Among Female Teens — United States, 1995, 2002, and 2006–2010

The 2010 U.S. teen birth rate of 34.3 births per 1,000 females reflected a 44% decline from 1990 (*1*). Despite this trend, U.S. teen birth rates remain higher than rates in other developed countries; approximately 368,000 births occurred among teens aged 15–19 years in 2010, and marked racial/ethnic disparities persist (*1,2*). To describe trends in sexual experience and use of contraceptive methods among females aged 15–19 years, CDC analyzed data from the National Survey of Family Growth collected for 1995, 2002, and 2006–2010 (*3*). During 2006–2010, 57% of females aged 15–19 years had never had sex (defined as vaginal intercourse), an increase from 49% in 1995. Younger teens (aged 15–17 years) were more likely not to have had sex (73%) than older teens (36%); the proportion of teens who had never had sex did not differ by race/ethnicity. Approximately 60% of sexually experienced teens reported current use of highly effective contraceptive methods (e.g., intrauterine device [IUD] or hormonal methods), an increase from 47% in 1995. However, use of highly effective methods varied by race/ethnicity, with higher rates observed for non-Hispanic whites (66%) than non-Hispanic black (46%) and Hispanic teens (54%). Addressing the complex issue of teen childbearing requires a comprehensive approach to sexual and reproductive health that includes continued promotion of delayed sexual debut and increased use of highly effective contraception among sexually experienced teens.

Nationally representative data on females aged 15–19 years were obtained from three survey cycles of the National Survey of Family Growth (NSFG): 1995, 2002, and 2006–2010. NSFG is an in-person, household survey conducted by CDC's National Center for Health Statistics using a stratified, multistage probability sample of females and males aged 15–44 years. The response rate for females was 76%. Survey topics included self-reported sexual activity and contraceptive use (*4*). Respondents who answered "yes" to ever having vaginal intercourse were considered sexually experienced.

Respondents who were pregnant, postpartum, seeking pregnancy, or who had not had sex during the interview month were excluded from analyses on contraceptives used during the interview month. The remaining respondents were classified as currently using contraception (specifying up to four methods) or not currently using contraception. Current contraceptive users were classified further by their most effective method used (according to typical use effectiveness estimates for pregnancy prevention) (*3*), based on the following hierarchy: 1) users of highly effective methods, including respondents who used long-acting reversible contraception (i.e., intrauterine device [IUD] or implant), pill, patch, ring, or injectable contraception (with or without dual use of condoms), or who were sterilized or had a partner who was sterilized (both were rare for teens); 2) users of moderately effective methods, including respondents who used condoms alone; and 3) users of less effective methods, including respondents who used withdrawal,

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periodic abstinence, rhythm method, emergency contraception, diaphragm, female condom, foam, jelly, cervical cap, sponge, suppository, or insert.

Weighted least squares regression was used to assess the significance of trends in abstinence and contraceptive use over time. Differences in bivariate proportions between racial/ethnic and age subgroups were assessed using a standard two-tailed t-test without adjustment for multiple comparisons. Comparisons are statistically significant at $p<0.05$. All analyses were conducted using data management and statistical software to account for the complex sample design of the NSFG.

During 2006–2010, more than half (56.7%) of female teens had never had sex (Table), reflecting a 16% increase relative to the 1995 estimate of 48.9%. The proportion of teens who had never had sex did not differ significantly across racial/ethnic groups* (whites = 57.6%, blacks = 53.6%, Hispanics = 56.2%) (Table). Although the proportion of teens who had never had sex increased for all racial/ethnic groups from 1995 to 2006–2010, this increase was greatest for blacks (34% increase) and Hispanics (29% increase) compared with whites (15% increase). During 2006–2010, 72.9% of females aged 15–17 years had never had sex, compared with 36.5% of females aged 18–19 years.

During 2006–2010, among female teens who had sex during the interview month, but who were not pregnant, postpartum, or seeking pregnancy, 59.8% used a highly effective contraceptive method during the interview month (12.0% used a highly effective method with a condom and 47.8% used a highly effective method without a condom), 16.3% used a moderately effective method (i.e., condoms alone), 6.1% used a less effective method, and 17.9% did not use any contraception (Figure). A trend toward increasing use of highly effective methods was noted from 1995 to 2006–2010. Estimates for 2006–2010 reflect a relative 26% increase in use of highly effective methods, 43% decrease for moderately effective methods, 27% increase for less effective methods, and 7% decrease for no method use compared with 1995.

During 2006–2010, white teens (65.7%) reported a higher prevalence of highly effective method use than black teens (46.5%) and Hispanic teens (53.7%) (Figure). Nonuse of any contraceptive method was significantly higher among blacks (25.6%) and Hispanics (23.7%) compared with whites (14.6%). Among whites, the use of highly effective methods increased from 48.9% in 1995 to 65.7% in 2006–2010 (34% relative increase). Smaller increases were observed for Hispanics (19% relative increase) and blacks (4% relative increase). Method nonuse among whites decreased from 18.1% in 1995 to 14.6% in 2006–2010 (19% decline); however, rates increased among blacks from 21.4% in 1995 to 25.6% in 2006–2010 (20% increase). For females aged 15–17 years, the use of highly effective methods increased from 46.0% during 1995 to 56.5% during 2006–2010 (23% increase). For females

* Persons identified as Hispanic might be of any race; persons in all other racial/ethnic categories are non-Hispanic.

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TABLE. Percentage of females aged 15–19 years who had never had sex (defined as vaginal intercourse), by race/ethnicity and age group — National Survey of Family Growth, United States, 1995, 2002, and 2006–2010

	1995		2002		2006–2010		Change (1995 to 2006–2010)
Characteristic	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**
Total	**48.9**	**(46.1–51.8)**	**53.2**	**(49.7–56.8)**	**56.7**	**(46.8–66.6)**	**16***
Race/Ethnicity							
White, non-Hispanic	50.0	(46.4–53.5)	53.6	(48.5–58.6)	57.6	(46.0–69.2)	15*
Black, non-Hispanic	40.0	(34.0–46.1)	43.0	(37.2–48.9)	53.6	(48.0–59.2)	34*
Hispanic	43.5	(35.5–51.4)	59.6	(52.4–66.7)	56.2	(47.2–65.3)	29*
Age group (yrs)							
15–17	61.4	(57.9–64.9)	69.7	(65.6–73.7)	72.9	(63.6–82.2)	19*
18–19	28.9	(25.1–32.6)	29.4	(24.6–34.3)	36.5	(24.3–48.7)	26

Abbreviation: CI = confidence interval.
* Trend is statistically significant at p<0.05.

aged 18–19 years, the use of highly effective methods increased from 48.4% during 1995 to 61.8% during 2006–2010 (28% increase). Rates of nonuse among younger teens declined from 23.9% to 19.5% (19% decline) but remained relatively stable for older teens at 16.3% in 1995 and 16.9% during 2006–2010.

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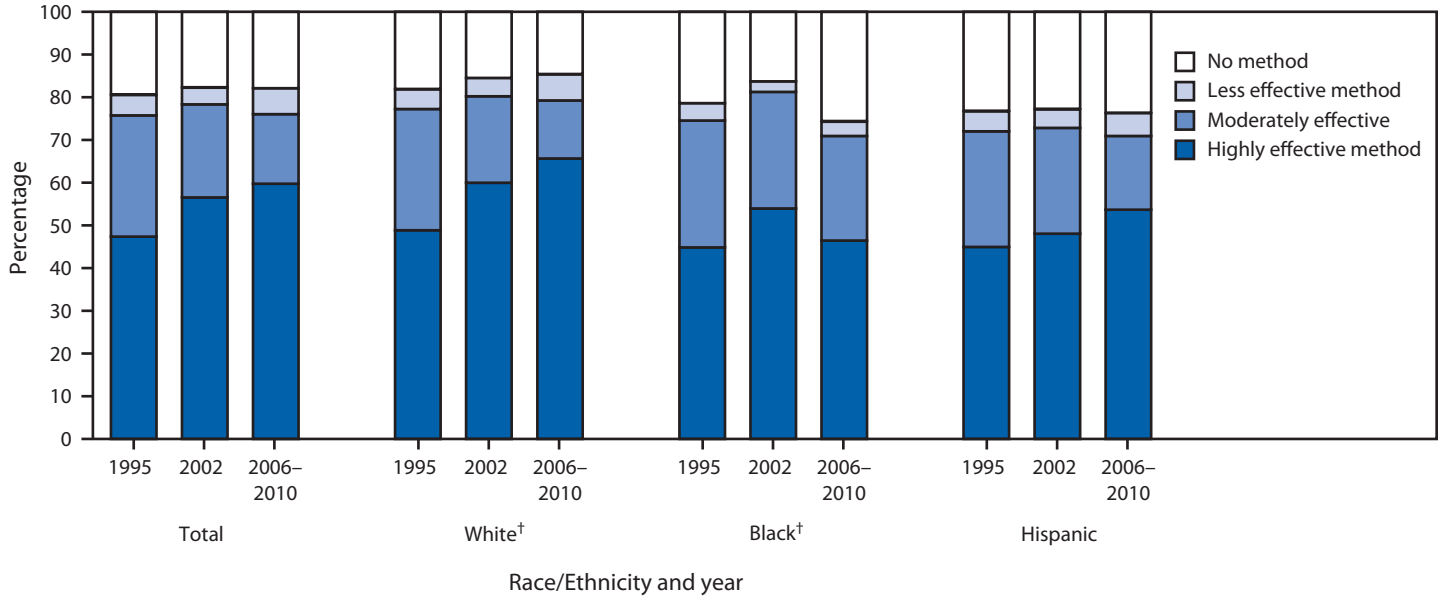
Editorial Note

In 2010, the U.S. teen birth rate declined to the lowest level in seven decades of reporting and reached record lows for teens of all racial/ethnic and age groups (*1*). Declines since 1995 likely reflect significant increases in the proportion of female teens who were abstinent, and among sexually experienced female teens, increases in the proportion using highly effective contraception (*5*).

FIGURE. Current contraceptive status among females aged 15–19 years who had sex during the interview month, by period, race/ethnicity, and effectiveness of method used* — National Survey of Family Growth, United States, 1995, 2002, and 2006–2010



* Highly effective methods include long-acting reversible contraception (i.e., intrauterine device or hormonal implant); hormone-containing pill, patch, or ring; or injectable hormones; all with or without condoms; or sterilization of respondent or partner (which is rare for teens). Moderately effective methods include condom use alone. Less effective methods include withdrawal, emergency contraception, diaphragm, female condom, foam, jelly, cervical cap, sponge, suppository, or insert.
† Non-Hispanic.

The proportion of female teens who never have had sex is now comparable across racial/ethnic groups, largely because of proportionately larger increases in delayed sexual debut observed since 1995 among black teens and Hispanic teens compared with white teens. Disparities persist, however, in the use of highly effective methods of contraception. Use of these methods remains highest among white teens, and increases over time have occurred at a greater rate among whites compared with blacks and Hispanics.

Achieving the *HealthyPeople 2020* objective[†] of reducing teen pregnancy by 10% will require a comprehensive approach to sexual and reproductive health that includes continued promotion of delayed sexual debut and increased use of highly effective contraception among sexually experienced teens. Condoms, the method used by many teens, can provide effective protection against unintended pregnancy when used consistently and correctly; however, during 2006–2010, only about half (49%) of female teens who used a condom for contraception reported consistent use in the past month (*6*). Dual use of condoms with a highly effective method of contraception can provide pregnancy protection with the added benefit of preventing sexually transmitted infections, including infection with human immunodeficiency virus, which affects teens disproportionately. Given that hormonal contraception and IUDs can be obtained only from a health-care provider, yearly reproductive health visits for teens who are sexually experienced or contemplating sexual activity can facilitate discussions about the advantages of delaying sexual debut, access to contraception, and the subsequent reduction of teen pregnancy (*7,8*).

An analysis of data from CDC's Pregnancy Risk Assessment Monitoring System on female teens who had delivered a live infant within 2–6 months and reported that their pregnancy was unintended found that half were not using contraception when they got pregnant (*9*). Ways to reduce barriers to decrease teen pregnancy include encouraging teens to delay sexual debut, offering teens convenient practice hours, culturally competent and confidential counseling and services, and low-cost or free services and methods.

The findings in this report are subject to at least three limitations. First, estimates of contraceptive use are self-reported; however, NSFG was designed specifically to minimize potential sources of response error (*4*). Second, current use of a contraceptive method during the interview month does not necessarily reflect sustained use over time. Finally, data were not available to examine current sexual activity or contraceptive use among female teens aged <15 years, who accounted for 4,500 births in 2010 (*1*).

Several actions can be taken to reduce teen pregnancy further. Schools and community- based organizations can 1) provide evidence-based sexual and reproductive health education,[§] 2) support parents' efforts to speak with their children about advantages of delaying sexual debut and of delaying pregnancy, and 3) connect teens to health-care providers for reproductive health services. Health-care providers should be informed that no contraceptive method is contraindicated for teens solely on the basis of age (*10*) and encouraged to promote highly effective contraception, preferably with the dual use of condoms. Teen pregnancy might be reduced further if health-care professionals provide culturally competent, evidence-based sexual and reproductive health counseling on the importance of correct and consistent use of contraception, and offer an array of contraceptive methods to teens who have had sex or are about to initiate sexual activity.

What is already known on this topic?

Teen birth rates in the United States continue to decline; however, racial/ethnic disparities persist, and U.S. rates remain much higher than in most other developed countries.

What is added by this report?

The 2010 U.S. teen birth rate of 34.3 births per 1,000 females aged 15–19 years was a 44% decline from 1990. During 2006–2010, 57% of female teens had never had sex, an increase from 49% in 1995. Approximately 60% of sexually experienced female teens reported current use of highly effective contraceptive methods, an increase from 47% in 1995. Use of highly effective methods varied by race/ethnicity, with higher rates observed for white teens (66%) than for black (46%) or Hispanic teens (54%). Because of increases in delayed sexual debut among blacks and Hispanics, the proportion of female teens who have never had sex is now comparable across racial/ethnic groups.

What are the implications for public health practice?

Key actions to reduce teen pregnancy include counseling teens to delay initiation of sexual activity, and among teens who are sexually active, using culturally competent counseling to address racial/ethnic gaps in the use of highly effective methods of contraception (ideally accompanied by dual use of condoms).

[†] Objective FP-8, available at http://www.healthypeople.gov/2020/topicsobjectives2020/pdfs/familyplanning.pdf.

[§] The Community Preventive Services Task Force recommends comprehensive risk reduction interventions. Additional information is available at http://www.thecommunityguide.org/news/2012/crrandaeinterventions.html.

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Imported Human Rabies in a U.S. Army Soldier — New York, 2011

On August 19, 2011, a male U.S. Army soldier with progressive right arm and shoulder pain, nausea, vomiting, ataxia, anxiety, and dysphagia was admitted to an emergency department (ED) in New York for suspected rabies. Rabies virus antigens were detected in a nuchal skin biopsy, rabies virus antibodies in serum and cerebrospinal fluid (CSF), and rabies viral RNA in saliva and CSF specimens by state and CDC rabies laboratories. An Afghanistan canine rabies virus variant was identified. The patient underwent an experimental treatment protocol (*1*) but died on August 31. The patient had described a dog bite while in Afghanistan. However, he had not received effective rabies postexposure prophylaxis (PEP). In total, 29 close contacts and health-care personnel (HCP) received PEP after contact with the patient. This case highlights the continued risks for rabies virus exposure during travel or deployment to rabies-enzootic countries, the need for global canine rabies elimination through vaccination, and the importance of following effective PEP protocols and ensuring global PEP availability.

Case Report

On August 14, 2011, a previously healthy soldier, aged 24 years, traveled from Grafenwöhr, Germany, to Fort Drum, New York, to begin a new military assignment (Figure). In transit, he experienced neck and shoulder pain and right arm and hand paresthesias. During the days following, he experienced fever, nausea, vomiting, and on August 18, difficulty swallowing. He visited the ED at hospital A on August 15 and 17 and was discharged with diagnoses of neck tendinitis and gastritis, respectively. He twice visited a chiropractor for his pain during August 15–16.

On August 19, the patient experienced ataxia and syncope, was evaluated at Fort Drum's medical facility, and was transferred to the ED at hospital A. Upon arrival, he was dehydrated and markedly hydrophobic. He was lucid and described having received a dog bite on the right hand during January 2011 while deployed to Afghanistan. Rabies was suspected on the basis of symptoms and this history. The New York State Department of Health (NYSDOH) and CDC were notified. The patient was transferred to hospital B, where a nuchal skin biopsy was performed and samples of serum, saliva, and CSF obtained. On August 20–21, Wadsworth Center (NYSDOH's public health laboratory) detected rabies virus antigens in hair follicles of nuchal skin biopsy specimens by direct immunofluorescence, and rabies viral RNA in saliva and CSF by reverse transcriptase–polymerase chain reaction. CDC corroborated these findings and detected rabies virus antibodies in serum and CSF. The viral RNA sequence was compatible with a canine rabies virus variant associated with dogs in Afghanistan.

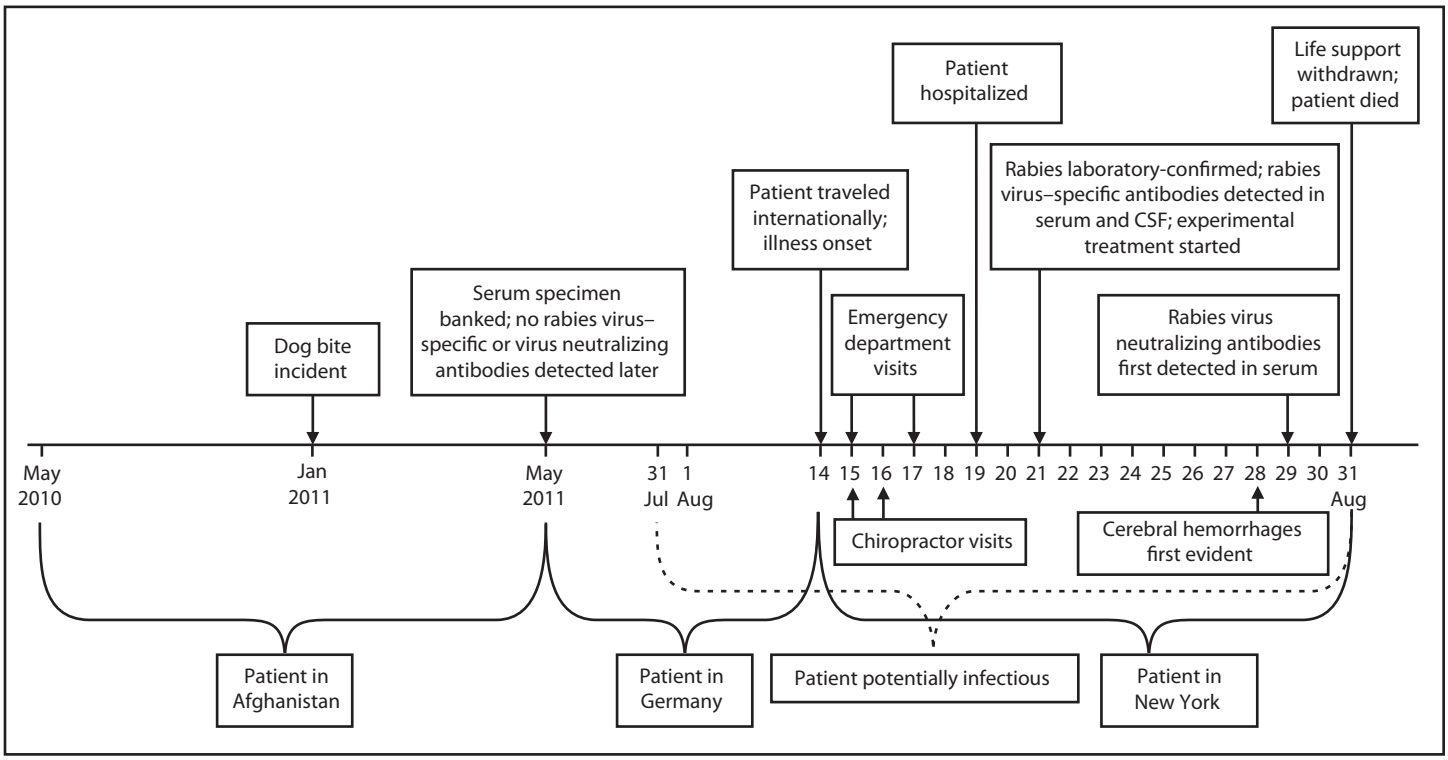
Before the patient's admission to hospital B, staff members were notified, and isolation precautions (including goggles, gowns, gloves, and face masks for all HCP who had contact with the patient) were instituted. Upon admission, the patient exhibited severe aerophobia and hydrophobia, became combative and agitated, and was intubated for airway protection. Dysautonomia and fixed dilated pupils were noted. Computed tomography scan of the brain revealed no abnormalities. Complete heart block required temporary pacemaker placement. Ketamine, fentanyl, and midazolam were administered according to an experimental treatment protocol (*1*). On hospitalization day 2, an external ventricular drain was placed to monitor intracranial pressure. On day 3, the patient experienced severe neurogenic diabetes insipidus. On day 4, severe brain edema caused erratic intracranial pressure measurements. The patient experienced severe acute respiratory distress syndrome. Extracorporeal membrane oxygenation, anticoagulation, and a hypothermia protocol were started. Chest radiographs indicated worsening confluent parenchymal opacities. These findings, in addition to leukocytosis, prompted intravenous vancomycin and ceftazidime administration beginning on day 6.

On days 10–11, computed tomography revealed two small intracerebral hemorrhages. On day 11, extracorporeal membrane oxygenation and anticoagulation were discontinued, fresh frozen plasma and factor VII were administered, and mechanical ventilation maintained oxygen saturation. On day 12, severe intracerebral hemorrhage was evident, and recovery was deemed unlikely. With the family's agreement, life support was withdrawn on day 13 (August 31), and the patient died.

Wadsworth Center and CDC tested specimens daily for clinical monitoring (*1*). Rabies virus–specific immunoglobulin M and immunoglobulin G antibodies were present and increased in serum and CSF throughout hospitalization. Virus neutralizing antibodies (VNA) were first detected in serum at 0.07 IU/mL on August 28 and increased to 0.50 IU/mL on August 31, the day the patient died. No VNA were detected in CSF through August 29, the last day a sample was submitted.

On autopsy, all central nervous system specimens demonstrated edema and mononuclear inflammation. Neurons contained eosinophilic intracytoplasmic inclusions. Immunohistochemical and immunofluorescent staining revealed abundant rabies virus antigens distributed diffusely.

FIGURE. Timeline of events surrounding an imported case of human rabies in a U.S. Army soldier — Afghanistan, Germany, and New York, 2011



Public Health Investigation

Beginning on August 19, public health officials from multiple jurisdictions were notified about the case. Local health departments and the U.S. Army, with assistance from NYSDOH and CDC, interviewed the patient's close contacts, including friends, family members, fellow travelers, HCP, hotel staff members, and members of his new and former military units to provide risk assessments and PEP recommendations. Interviewees were counseled regarding rabies virus exposure risks and types of contact that constitute exposures. The patient was considered potentially infectious during the 14 days before illness onset, per CDC recommendations (Charles E. Rupprecht, CDC, personal communication, 2012).

The investigation identified approximately 190 persons who had interacted with the patient during his travel or while in New York. Thirteen persons met exposure criteria (defined as wound or mucous membrane exposure to the patient's saliva, CSF, neural tissue, or tears) and received PEP consistent with Advisory Committee on Immunization Practices guidelines (*2*). All exposures occurred before rabies was suspected. Nine HCP contacts without confirmed exposures also received PEP. No seatmates on flights from Germany to New York had exposures requiring PEP. Among 50 assessed members of the patient's previous Army unit in Germany, seven met exposure criteria and received PEP. The patient had no known contact with additional persons in Germany, except a taxi driver, who did not require PEP.

In January 2011, while in Afghanistan, the patient reported to family members and close friends that he had been bitten by a feral dog and had sought medical treatment, which he described as wound cleansing and injections. However, an Army investigation revealed no documentation of a reported bite wound or treatment. A May 2011 banked serum specimen, tested at CDC in August 2011, did not contain rabies virus–specific antibodies or VNA, further indicating that the patient had not received PEP. No record of submission of the dog for rabies diagnosis was obtained.

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What is already known on this topic?

If not prevented by postexposure prophylaxis, rabies virus infection causes an acute progressive encephalitis that is nearly always fatal. Although considered eliminated from the United States, canine rabies is responsible for the majority of rabies deaths worldwide.

What is added by this report?

In August 2011, a recently returned U.S. Army soldier died of rabies after being bitten by a dog in Afghanistan; he did not receive correct postexposure prophylaxis. This is the first rabies death among U.S. service members since 1974.

What are the implications for public health practice?

This case demonstrates the need to avoid animal contact while in rabies-enzootic regions and to seek prompt medical evaluation after any animal bite. Early clinical suspicion of rabies and infection control measures can help reduce the need for postexposure prophylaxis among health-care personnel. Prompt suspicion and confirmation of rabies can inform experimental treatment decisions. Canine rabies is and will remain a risk to residents and visitors of many countries around the globe until it is eliminated through vaccination of animals.

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Editorial Note

This report is the first since 1974 of a U.S. service member dying from rabies after an overseas dog exposure (*3*). This case highlights the importance of rabies risk awareness for all travelers, including service members, and the need for prompt medical care, including PEP, for potential exposures. Although canine rabies virus transmission is considered eliminated in the continental United States (*4*), dog exposures remain a concern for all residents and travelers abroad in canine rabies–enzootic areas. During 1996–August 2011, a total of 10 of 45 reported U.S. human rabies cases were associated with canine variant viruses, and all resulted from dog exposures occurring overseas (*5*). Canine rabies variants acquired as the result of dog bites in Africa and Asia account for >95% of all human rabies deaths worldwide (*6*). Travel-associated rabies virus exposure rates have not been calculated with accuracy (*6*).

Clinical human rabies infections are nearly always fatal, even when treated using an experimental protocol (*1*). In this case, after-clinical-onset treatment efforts failed. Prompt PEP administration remains the only consistent method for preventing death after rabies virus exposure (*2*).

With the exception of transmission through transplantation, human-to-human rabies transmission has not been laboratory-documented but is possible theoretically (*7*) because rabies virus can be present in saliva, CSF, neural tissue, and tears. Infection control practices can decrease the risk for virus transmission to caregivers of patients with suspected or confirmed rabies. Once rabies is suspected, HCP should wear goggles, gowns, gloves, and face masks, particularly during activities with risk for saliva contact (e.g., intubation and suctioning) (*2*). Rapid institution of these precautions at hospital B demonstrated these measures' value for reducing exposures in the health-care setting: none of approximately 150 HCP who had patient contact required PEP. If rabies is confirmed, a standardized risk assessment of patient contacts should be conducted, with strict application of the exposure definitions detailed by ACIP (*2*). A rabies patient's autopsy can be conducted safely in facilities equipped to handle postmortem evaluations of infectious disease patients, using standard barrier precautions (i.e., an N95 or higher-grade respirator, full face shield, goggles, heavy gloves, and complete body coverage by protective wear) (*8*).

The patient's travel while potentially infectious added a unique public health concern. Local, state, federal, and international parties collaborated to ensure that all persons who potentially had contact with the patient's infectious secretions during his travel were reached for timely risk assessment. None required PEP.

Travelers should be informed of rabies risks when traveling to rabies-enzootic countries and should be encouraged to keep a safe distance from wild and feral animals. Travelers receiving bites or scratches from such animals should wash the wound thoroughly with soap and water and promptly seek medical attention. Persons who are at increased risk for exposure because of professional or tourist activities in enzootic areas or who might have limited access to medical resources should consult a physician about preexposure vaccination before departure and consider purchasing travel insurance that includes a provision for medical evacuation (*6,9*). Additional recommendations for travelers are available in the CDC *Yellow Book: Health Information for International Travel 2012* (*6*) and at http://wwwnc.cdc.gov/travel. The case described in this report underscores the need for global partnerships for the prevention, control, and future elimination of canine rabies virus transmission (*10*).

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Comparison of Meningococcal Disease Surveillance Systems — United States, 2005–2008

Meningococcal disease is a nationally notifiable disease caused by the bacterium *Neisseria meningitidis*. Rates of the disease have decreased since 2000 and are currently at a historic low (*1*). The National Notifiable Diseases Surveillance System (NNDSS) and Active Bacterial Core surveillance (ABCs) are the two surveillance systems in the United States that track cases of meningococcal disease (*2*). Whereas NNDSS (a passive surveillance system) covers all of the United States and records both probable and confirmed cases of meningococcal disease, ABCs (an active surveillance system) covers six states and portions of four other states and records only culture-confirmed cases. However, ABCs surveillance data are more detailed than NNDSS and are more widely used in vaccine policy and development. To determine whether ABCs estimates of the number of cases of meningococcal disease were far lower than NNDSS counts and the contribution of polymerase chain reaction (PCR) to that difference, CDC conducted an analysis to compare the two systems. CDC compared 1) the number of meningococcal disease cases reported by NNDSS in ABCs areas during 2005–2008 with the number reported by both systems and 2) the mean annual number of cases reported by NNDSS nationally during 2005–2008, with the mean projected national number from ABCs. The results of these two calculations indicated that 8.9% or 14.5% of meningococcal disease cases reported by NNDSS, respectively, were not reported by ABCs, most commonly because they were probable cases detected by PCR testing. Because ABCs data do not substantially underestimate the number of cases of meningococcal disease, implementing PCR testing for *N. meningitidis* in all ABCs reference laboratories likely would not increase estimates of disease greatly.

NNDSS comprises confirmed and probable cases (Table 1) identified through passive reporting in all 50 states, the District of Columbia, and five territories (*3*). ABCs is an active, laboratory- and population-based surveillance system that is part of CDC's Emerging Infections Program (EIP) network (*4,5*). ABCs conducts surveillance for *N. meningitidis* in a catchment area consisting of six states and portions of four other states (Connecticut, Georgia, Maryland, Minnesota, New Mexico, Oregon, and selected counties in California, Colorado, New York, and Tennessee). The area has 41.4 million U.S. residents, approximately 13% of the U.S. population. Confirmed cases reported by ABCs are defined by isolation through culture of *N. meningitidis* from a normally sterile site in a resident of the ABCs surveillance area. Cases identified in ABCs also should be reported to NNDSS.

Bacterial culture is the criterion standard for diagnostic confirmation of meningococcal disease; however, latex agglutination, Gram stain, specific clinical criteria, and detection of *N. meningitidis* DNA by PCR all are used for diagnosis. PCR can have greater diagnostic sensitivity than culture, particularly when antibiotics are administered before collection of a specimen for culture (*6*). PCR for meningococcal disease diagnosis is not standardized or widely available, but is being used by some state public health laboratories. ABCs reports only culture-confirmed meningococcal disease cases, whereas NNDSS reports both culture-confirmed cases and probable cases identified by PCR and other testing methods.

Incidence estimates derived from ABCs surveillance are used to help guide vaccine policy and development because of the system's high specificity, data completeness, and collection of isolates for determination of serogroup and molecular epidemiology. However, ABCs likely underestimates the actual number of cases of meningococcal disease because probable cases diagnosed by PCR and other nonculture diagnostic tests are not reported. To understand the extent to which ABCs might underestimate meningococcal disease incidence, CDC identified the number of cases reported by NNDSS during 2005–2008 that occurred within ABCs surveillance areas but were not reported by ABCs. In addition to comparisons from ABCs surveillance sites only, CDC compared NNDSS and ABCs data on a national scale, projecting case counts from ABCs to the national level. Projected national counts from ABCs are estimated by standardizing ABCs estimates for race and age group (*1*). Finally, subanalyses were conducted regarding diagnostic practices that produced discrepant cases in selected ABCs sites, and assessment of PCR practices and capacity in all ABCs sites.

ABCs versus NNDSS data from 10 ABCs states only. Cases were categorized as reported in the ABCs database only, reported in the NNDSS database only, or reported by both systems. During 2005–2008, a total of 728 unique meningococcal disease cases were reported by NNDSS and/or ABCs from the ABCs states. Of the 728 cases, 65 (8.9%) were reported by NNDSS only, 23 (3.2%) by ABCs only, and 640 (87.9%) by both databases. The reason 23 were reported by ABCs but not NNDSS is unknown.

TABLE 1. Characteristics of surveillance systems for meningococcal disease — United States, 2005–2008

Characteristic	NNDSS	ABCs
Surveillance type	Passive	Active
Population coverage	100%	13%
Confirmed case definition	*Neisseria meningitidis* cultured from normally sterile anatomic site	*N. meningitidis* cultured from normally sterile anatomic site
Probable case definition	Detection of polysaccharide antigen by latex agglutination, PCR, or immunohistochemistry in cerebrospinal fluid OR Clinically compatible illness with purpura fulminans	Not applicable

Abbreviations: NNDSS = National Notifiable Diseases Surveillance System; ABCs = Active Bacterial Core surveillance; PCR = polymerase chain reaction.

NNDSS versus ABCs data projected to national scale. During 2005–2008, the mean annual number of reported meningococcal disease cases (probable and confirmed) from NNDSS overall was 1,172 (range: 1,077–1,245). From ABCs, the projected national mean annual case count (including all serogroups) was 1,002 (range: 914–1,045). Based on these national estimates, ABCs estimated 14.5% fewer annual cases of meningococcal disease than NNDSS.

Subanalysis of five ABCs states by NNDSS diagnostic criteria. Five ABCs states (California, Georgia, Minnesota, Maryland, and Oregon) with more than six cases reported by NNDSS and not by ABCs (n = 56) were asked to provide additional information on the NNDSS diagnostic criteria used for the discrepant cases. Diagnostic criteria included PCR in 24 (42.9%) cases, "unknown" laboratory confirmation in 11 (19.6%), Gram stain in 10 (17.9%), and latex agglutination in seven (12.5%). The diagnosis of meningococcal disease in four (7%) was based on clinical suspicion alone (Table 2).

PCR practices of 10 ABCs states. Of the 10 ABCs states, only California, Georgia, and Minnesota had laboratory capacity to perform PCR for diagnosis of meningococcal disease during the study period. In each of these three states, only one laboratory had PCR capacity for meningococcal testing. The decision protocol for submission of a specimen for PCR testing in the 10 states varied considerably, from absence of guidelines to inconsistent implementation of guidelines across counties. A higher proportion of NNDSS cases from the three states with routine PCR testing (38 of 286, 13.3%) were reported only to NNDSS than from the states without routine PCR testing (26 of 442, 5.9% [p<0.001]). In the three states with routine PCR testing, approximately 8% of NNDSS cases were identified by PCR (nine of 111 cases, 8.1%; six of 82, 7.3%; and eight of 93, 8.6%, respectively).

Reported by

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Editorial Note

Because meningococcal disease is nationally notifiable both by NNDSS and ABCs surveillance, the two systems can be compared and the contribution of their different diagnostic criteria can be evaluated. PCR was the most common nonculture diagnostic test used in the three ABCs states that routinely conducted PCR testing for meningococcal disease. These states

TABLE 2. Number of reported cases of meningococcal disease and criteria used for diagnosis — five ABCs states,* 2005–2008

State	No. of reported meningococcal disease cases overall (NNDSS and ABCs)	No. of cases reported by NNDSS and not by ABCs	Diagnostic criteria used by NNDSS				
			PCR	Latex agglutination	Gram stain	Clinical suspicion only	Unknown laboratory confirmation
California (ABCs counties)	111	18	9	—	—	1	8
Georgia	82	12	6	2	2	2	—
Minnesota	93	8	8	—	—	—	—
Maryland	85	9	1†	5	2	—	1
Oregon	178	9	—	—	6	1	2
Total	**549**	**56**	**24**	**7**	**10**	**4**	**11**

Abbreviations: NNDSS = National Notifiable Diseases Surveillance System; ABCs = Active Bacterial Core surveillance; PCR = polymerase chain reaction.
* The five ABCs states with more than six cases reported by NNDSS but not by ABCs.
† PCR performed by CDC.

What is already known on this topic?

National Notifiable Diseases Surveillance System (NNDSS) and Active Bacterial Core surveillance (ABCs) are the surveillance systems for meningococcal disease in the United States. ABCs detects only culture-confirmed meningococcal disease cases while NNDSS detects probable cases defined by polymerase chain reaction (PCR) and other tests as well as culture-confirmed cases. However, the extent to which ABCs underestimates incidence by missing probable cases was unknown.

What is added by this report?

During 2005–2008, depending on the method of calculation, 8.9% or 14.5% of the total number of reported meningococcal disease cases were reported by NNDSS and not by ABCs, most commonly because they were detected by PCR. Use of PCR is not common or systematic across states. Of the three ABCs states that use PCR routinely for the diagnosis of *Neisseria meningitidis* infection, approximately 8% of cases were detected by PCR.

What are the implications for public health practice?

Although ABCs only captures confirmed meningococcal disease cases, comparisons with NNDSS indicate that ABCs data do not underestimate the number of cases substantially. A recommendation to implement PCR testing for *N. meningitidis* in all reference laboratories would not appreciably improve the estimates for meningococcal disease. However, the contribution of PCR testing to meningococcal disease reporting should continue to be monitored.

reported more cases of meningococcal disease under NNDSS definitions than states that did not use PCR testing. However, PCR testing was not performed on all specimens; therefore, estimating the actual proportion of specimens that would test negative by culture but positive by PCR is difficult.

In countries such as the United Kingdom, PCR is a routine diagnostic modality for patients with meningitis; therefore, a large proportion of cases are confirmed by PCR (*7,8*). In countries that rely on PCR for diagnosis, surveillance that includes cases identified by PCR is important. However, this study suggests that the additional cases identified through nonculture methods are not enough to warrant a change in the use of ABCs to guide vaccine policy and develop U.S. incidence projections and supports continued use of culture-confirmed surveillance. Among the ABCs states, approximately 8% of cases reported to NNDSS were diagnosed by PCR (as probable cases) and might have been missed by ABCs diagnostics (culture-confirmed) alone. If PCR had been used systematically in all suspected cases, this proportion might have been higher, as evidenced by the significantly higher proportion of discrepant cases from states with routine PCR testing, as compared with states without routine PCR testing. Nonetheless, in this study, ABCs culture-based surveillance captured >85% of cases of meningococcal disease.

The findings in this report are subject to at least two limitations. First, ABCs represents only 13% of the U.S. population, and data from the ABCs catchment area might not be generalizable to the rest of the United States. Second, use of PCR testing did not contribute substantially to overall national disease incidence during the study period, and assessing the potential contribution of a standardized system of PCR testing to national meningococcal disease surveillance is difficult. If the use of PCR in meningococcal disease diagnosis increases in coming years, a reassessment of the analyses in this study might be warranted.

Because ABCs has more complete and accurate data on serogroup, underreporting of cases is acceptably low and validates the use of ABCs as an important source of meningococcal disease data. In the United States, PCR can be a useful tool for decision-making regarding treatment or chemoprophylaxis. However, universal implementation of PCR for surveillance purposes does not appear warranted at this time.

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Notes from the Field

Identification of *Vibrio cholerae* Serogroup O1, Serotype Inaba, Biotype El Tor Strain — Haiti, March 2012

On October 20, 2010, an outbreak of cholera was confirmed in Haiti for the first time in more than a century. As of April 10, 2012, a total of 534,647 cases, 287,656 hospitalizations, and 7,091 deaths have been reported in Haiti as a result of the outbreak (*1*). The *Vibrio cholerae* strain that caused the Haiti epidemic has been characterized as toxigenic *V. cholerae*, serogroup O1, serotype Ogawa, biotype El Tor (*2*).

Recently, two *V. cholerae* isolates collected on March 12 and 13, 2012, in Anse Rouge, Artibonite Department, were characterized at the National Public Health Laboratory in Haiti as non-Ogawa serotypes. The isolates subsequently were confirmed by CDC to belong to the Inaba serotype. By molecular analyses (pulsed-field gel electrophoresis, multilocus variable number of tandem repeat analysis, and virulence gene sequencing [*ctxB* and *tcpA*]), these two isolates are indistinguishable from the currently circulating *V. cholerae* serotype Ogawa strain in Haiti. The molecular analyses conducted to date suggest that they arose from serotype switching, which is a commonly observed phenomenon in cholera epidemics, often driven by population immunity to the circulating serotype. Further characterization efforts are ongoing. Finding these two isolates does not change current clinical management guidelines (*3*).

Ogawa and Inaba serotypes do not appear to differ in the severity or duration of illness they cause; most persons infected with *V. cholerae* of either serotype will not develop clinically apparent disease. Type-specific immunity is induced by infection; however, cross-protective immunity between the two serotypes is incomplete (*4*). Previous studies have indicated that the Ogawa serotype offers less protective immunity than Inaba from reinfection with the heterologous serotype (*5*). Thus, if the Inaba strain becomes established in Haiti, persons who previously were infected with the Ogawa serotype of *V. cholerae* might be relatively more susceptible to reinfection with the Inaba serotype than with the Ogawa serotype because there tends to be stronger serotype-specific protective immunity. Immunologically naïve persons are equally susceptible to both serotypes. Because the Inaba strain is also biotype El Tor, its ability to survive outside of a host is likely the same as that of the Ogawa strain.

The two World Health Organization prequalified vaccines provide protection against the Ogawa and Inaba serotypes. In addition, the cholera rapid diagnostic tests detect all O1 serogroup infections, including Ogawa and Inaba serotypes.

This serotype conversion illustrates the increasing diversity of *V. cholerae* in Haiti (*2*) and emphasizes the importance of continued public health surveillance by the National Public Health Laboratory and CDC, which are partnering to establish a laboratory-enhanced sentinel surveillance system for a range of infectious diseases, including cholera and other diarrheal diseases. The system will provide data to determine the burden of diarrheal disease attributable to cholera and to help direct prevention efforts and programs to reduce morbidity and mortality from cholera in Haiti.

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Notes from the Field

Multistate Outbreak of Postprocedural Fungal Endophthalmitis Associated with a Single Compounding Pharmacy — United States, March–April 2012

On March 5, 2012, the California Department of Public Health was notified of nine cases of clinically diagnosed fungal endophthalmitis at a single California ambulatory surgical center. The initial investigation, led by the Los Angeles County Department of Public Health, determined that in all cases patients had undergone vitrectomy with epiretinal membrane peeling using a dye called Brilliant Blue-G (BBG) from Franck's Compounding Lab, Ocala, Florida. This investigation has since expanded to involve intravitreal injection of triamcinolone-containing products from Franck's, an overall total of 33 cases in seven states, and collaboration between state and local health departments, CDC, and the Food and Drug Administration (FDA). This report describes the current investigative findings. Clinicians should be aware of the ongoing investigation and should avoid use of compounded products labeled as sterile from Franck's during this ongoing investigation.

A probable case is defined as ophthalmologist-diagnosed fungal endophthalmitis occurring in a patient who underwent an invasive ophthalmic procedure, including but not limited to vitrectomy, corneal surgery, or intravitreal injections on or after August 23, 2011, the production date of the contaminated BBG lot. Confirmed cases meet criteria for probable infection and also have fungi identified from the affected eye by culture, genetic sequencing, or histopathology. Active case-finding in this investigation has included calls for cases through Epi-X postings, FDA MedWatch alerts, ClinMicroNet microbiology laboratories, e-mails sent to all members of two professional ophthalmology societies, and state and local health alerts.

As of April 30, a total of 33 confirmed and probable cases have been identified, with earliest onset of symptoms in November 2011. Of these, 20 cases (13 probable and seven confirmed) are associated with BBG dye use, and 13 (two probable and 11 confirmed) are associated with triamcinolone use. All BBG or triamcinolone products administered to patients reportedly were purchased from Franck's. All available isolates from the seven confirmed cases associated with BBG dye use were identified by culture or genetic sequencing as the mold *Fusarium incarnatum-equiseti* species complex. All available isolates from the 11 confirmed cases that occurred following intravitreal injection of triamcinolone-containing products have been identified as the mold *Bipolaris hawaiiensis*. Both *Fusarium* and *Bipolaris* are ubiquitous molds present in air, soil, and water. Among the 30 patients for whom data are available, 23 (77%) have suffered some degree of vision loss, ranging from partial to severe, or worsened vision because of infection; 24 (80%) have required repeat ophthalmic surgery.

Culture of unopened bottles and intact (unused, pharmacy-prepared) syringes of BBG dye collected by FDA yielded multiple bacterial and fungal species, including *F. incarnatum-equiseti* species complex, *Rhodotorula*, *Bullera*, *Pseudomonas*, and *Enterobacter* species. Microbiologic testing of triamcinolone-containing products from Franck's is ongoing. On March 9, Franck's recalled all BBG dye lots; on March 31, a single lot of triamcinolone was recalled. The investigation to identify the root cause of product contamination is ongoing. The pharmacy has not recalled or halted production of other sterile compounded products, which, in addition to ophthalmic preparations, include chemotherapy and numerous other medications administered by injection (including intrathecal and epidural), inhalation, and intranasal routes.

Postprocedural endophthalmitis is uncommon, complicating 0.04% of either intravitreal injections or pars plana vitrectomies (*1,2*). The majority of these infections are bacterial; fungal infection is rare and often is diagnosed only after a patient has failed empiric antibacterial therapy. Clinicians are encouraged to be vigilant for postprocedure adverse events, particularly among patients who have received a product labeled as sterile from Franck's, and should consider methods to confirm and treat possible fungal infection.

Compounding pharmacies, which combine or alter medications from standard preparations, provide needed formulations that often are not available from pharmaceutical companies. Compounded sterile preparations must be prepared according to aseptic practices recommended by organizations such as the United States Pharmacopeia, as stated in *United States Pharmacopeia-National Formulary* (*3*). However, contamination of compounded sterile preparations has caused outbreaks. Since 1990, FDA has learned of approximately 200 adverse events associated with 71 compounded products (*4*). A recent outbreak of bacterial endophthalmitis following intravitreal injection of contaminated bevacizumab occurred after breaches in aseptic technique at a different compounding pharmacy (*5*).

Because of the seriousness of endophthalmitis and because the full extent of the outbreak and root cause of contamination remain unknown, CDC recommends that, at this time, clinicians avoid use of compounded products labeled as sterile from Franck's. Health-care providers should maintain a heightened suspicion for infections among patients who

received compounded products labeled as sterile from Franck's and should report suspected infections to their local and state health departments for further investigation. Patients also should avoid use of compounded products labeled as sterile from Franck's and report adverse events or suspected infections promptly to their physician.

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Announcements

National Arthritis Action Month — May 2012

May is National Arthritis Action Month. Arthritis affects approximately 50 million U.S. adults (*1*) and continues to be the most common cause of disability in the United States (*2*). This year's theme for National Arthritis Action Month, "Change the Course of Arthritis," is aimed to increase awareness of the important things persons can do to live well despite having arthritis.

Existing public health interventions, especially in combination with appropriate clinical management, can reduce the impact of arthritis on persons' lives. Self-management education helps persons with arthritis gain control by teaching techniques to manage symptoms and reduce pain and activity limitations. Moderate physical activity (e.g., walking, biking, or swimming) for 30 minutes a day, 5 days a week (or 150 minutes per week), reduces joint pain and stiffness in 4–6 weeks, and can be done in increments of as little as 10 minutes at a time (*3*). These interventions likewise help the many persons with arthritis who also have obesity, diabetes, or heart disease manage these conditions and improve their quality of life.

For persons with arthritis, evidence-based tools and interventions are available to minimize the impact of arthritis and increase their ability to live well. Information about these interventions is available at http://www.cdc.gov/arthritis. Additional information is available from the Arthritis Foundation (http://www.arthritis.org) and the National Institute of Arthritis and Musculoskeletal and Skin Diseases (http://www.nih.gov/niams).

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Living Well with Chronic Illness: a Call for Public Action

On April 30, 2012, the Institute of Medicine released the final version of a committee report titled, *Living Well with Chronic Illness: a Call for Public Action*. The independent report, funded by CDC and the Arthritis Foundation, identifies public health actions that might reduce disability and improve functioning and the quality of life of persons with chronic disease.

Beyond simply living longer, persons increasingly are interested in maintaining or even improving their capacity to live well over their entire lives. The committee defined the concept of living well as reflecting "the best achievable state of health that encompasses all dimensions of physical, mental, and social well-being."

The committee settled on a single guiding principle for their deliberations and recommendations: to help each affected person, and the population as a whole, to live well, regardless of the chronic illness in question or a person's current state of health. Instead of making recommendations for specific illnesses, the committee identified nine conditions that reflect the tremendous variation in chronic diseases and have had significant effects on the nation's health and economy to use as examples.* The committee concluded that the epidemic of chronic illness is moving toward crisis proportions but that maintaining or enhancing quality of life for persons living with chronic illnesses has not been given the attention it deserves.

The committee report offers 17 recommendations for immediate and specific steps CDC and other components of the U.S. Department of Health and Human Services, and other federal and state agencies, might take to address chronic illness. The report is available at http://iom.edu/reports/2012/living-well-with-chronic-illness.aspx.

* The nine conditions include arthritis, cancer survivorship, chronic pain, dementia, depression, type 2 diabetes, posttraumatic disabling conditions, schizophrenia, and vision and hearing loss.

Announcements

Drinking Water Week — May 6–12, 2012

The United States has one of the safest public drinking water supplies in the world (*1*). Tap water not only provides water for daily activities such as drinking, bathing, and cooking, it also benefits the entire community by providing water to serve businesses, schools, and hospitals, and to promote overall health (*2*). May 6–12, 2012, is Drinking Water Week, an annual observance whose theme, "Water: Celebrate the Essential," underscores the many services provided by public drinking water systems in the United States (*3*).

Disinfection and treatment practices, as well as the environmental regulation of water pollutants, have improved domestic water quality substantially during the past century and have led to a dramatic decrease in the incidence of waterborne diseases such as cholera and typhoid fever (*4–6*). Despite these improvements, sources of drinking water still can become contaminated, leading to adverse health effects (*7*).

New challenges to the U.S. water supply include an aging drinking water infrastructure, the impact of climate change on water availability and quality, chemical contamination of water sources, emerging pathogens, and the development of new ways to obtain and use water. Drinking Water Week is a time to highlight the importance of safe drinking water and recognize that protecting and reinvesting in water infrastructure is crucial to the health of persons living in the United States.

References

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National Nurses Week — May 6–12, 2012

CDC and other public health agencies are honoring nurses during National Nurses Week, May 6–12, 2012. This year's theme is "Nurses: Advocating, Leading, Caring."

The nursing profession plays a critical role in improving patient outcomes, increasing access, coordinating care, and reducing health-care costs. The Affordable Care Act and the Institute of Medicine's *Future of Nursing* report place nurses at the center of health-care transformation in the United States. Numerous studies have shown that patients fare worse when nurse staffing is inadequate, with poorer health outcomes, more complications, less satisfaction, and greater likelihood of death. A 2011 report linked inadequate nurse staffing with increased patient mortality (*1*).

Hospitals remain the most common employment setting for registered nurses (RNs) in the United States, increasing from 57.4% of employed RNs in 2004 to 62.2% in 2008. Vaccination providers or those who supervise vaccination providers typically are nurses. In 2011, in the annual Gallup poll, nurses were rated the most trusted profession in United States for the 12th time in 13 years (*2*). Nurses' honesty and ethics were rated "very high" or "high" by 84% of poll respondents.

Additional information about National Nurses Week is available at http://nursingworld.org/functionalmenucategories/aboutana/nationalnursesweek. Additional information about the American Nurses Association's immunization activities is available at http://www.anaimmunize.org.

References

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Announcement

Amyotrophic Lateral Sclerosis (ALS) Awareness Month — May 2012

May is Amyotrophic Lateral Sclerosis (ALS) Awareness Month. ALS, also known as Lou Gehrig's disease, is a progressive, fatal, neurodegenerative disorder of the upper and lower motor neurons. Persons with ALS usually die within 2–5 years of diagnosis.

In October 2010, the Agency for Toxic Substances and Disease Registry (ATSDR) launched the National ALS Registry to collect, manage, and analyze data regarding persons with ALS. The registry uses information provided by registrants with ALS through a secure Internet portal and existing data from national databases, including the Centers for Medicare and Medicaid Services and the U.S. Department of Veterans Affairs. Through the Internet portal, registrants can participate in brief surveys to provide additional information about their illness and possible risk factors so that researchers can gain a better understanding of ALS.

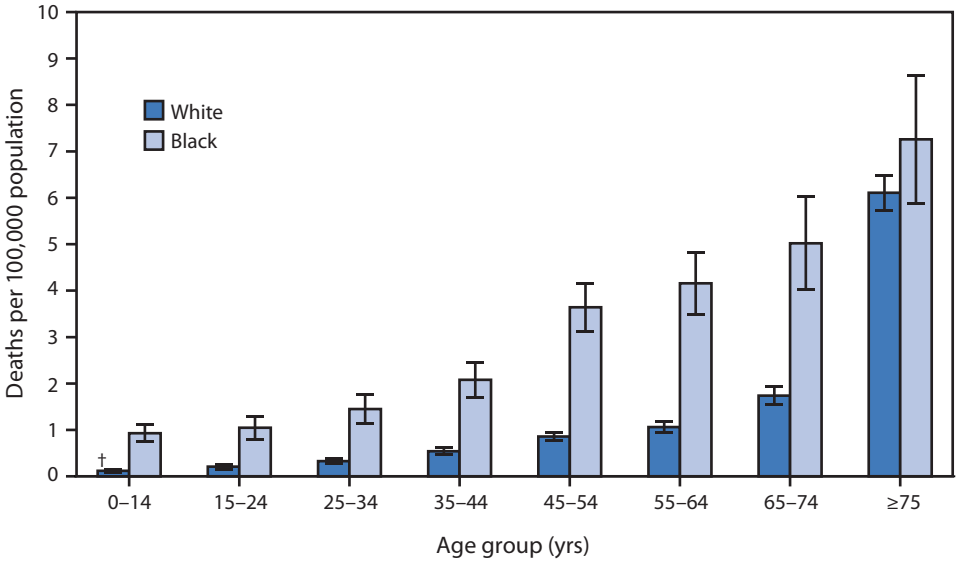
ATSDR is collaborating with the ALS Association, Muscular Dystrophy Association, and other organizations to make all ALS patients and their families aware of the opportunity to register in the National ALS Registry. When sufficient data have been gathered to provide a representative picture of patients with ALS in the United States, ATSDR will begin analyzing the data and providing deidentified data to other researchers.

In addition, ATSDR is undertaking various initiatives to help strengthen the National ALS Registry. These include using selected state and metropolitan area surveillance activities to help evaluate the registry's completeness, funding a bioregistry feasibility study to link potential specimen data collected (e.g., blood, saliva, and tissue) with existing registry surveys, and developing a system to inform registrants about new research studies and clinical trials. Additional information regarding these initiatives and the National ALS Registry is available at http://www.cdc.gov/als.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Asthma* Death Rates, by Race and Age Group — United States, 2007–2009



* Deaths from asthma are those coded J45–J46 in the *International Classification of Diseases, 10th Revision*.
† 95% confidence interval.

In 2007–2009, the asthma death rate in the United States was higher for blacks than whites overall and for each age group, except persons aged ≥75 years, for whom the difference was not statistically significant. The rate for blacks aged 0–14 years was almost eight times greater than for whites in that age group. The rate for blacks aged 65–74 years was only approximately three times higher than for whites in that age group. Asthma death rates increased with age for blacks and whites.

Sources: National Vital Statistics System. Available at http://www.cdc.gov/nchs/nvss/mortality_public_use_data.htm.

CDC. Health Data Interactive. Available at http://www.cdc.gov/nchs/hdi.htm.

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