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Measles Outbreak Associated with an Arriving Refugee — Los Angeles County, California, August–September 2011

Measles is a highly communicable, acute viral illness with potential for severe complications, including death. Although endemic measles was eliminated in the United States in 2000 as a result of widespread vaccination, sporadic measles outbreaks still occur, largely associated with international travel from measles-endemic countries and pockets of unvaccinated persons (*1*). On August 26, 2011, the Los Angeles County Department of Public Health (LACDPH) was notified of suspected measles in a refugee from Burma who had arrived in Los Angeles, California, on August 24, after a flight from Kuala Lumpur, Malaysia. Passengers on the flight included 31 other refugees who then traveled to seven other states, widening the measles investigation and response activities (*2*). In California alone, 50 staff members from LACDPH and the California Department of Public Health (CDPH) interviewed and reinterviewed 298 contacts. Measles was diagnosed in three contacts of the index patient (patient A). The three contacts with measles were two passengers on the same flight as patient A and a customs worker; no secondary cases were identified. Delayed diagnosis of measles in patient A and delayed notification of health officials precluded use of measles-mumps-rubella (MMR) vaccine as an outbreak intervention. This outbreak emphasizes the importance of maintaining a high level of vaccination coverage and continued high vigilance for measles in the United States, particularly among incoming international travelers; clinicians should immediately isolate persons with suspected measles and promptly report them to health authorities.

Case Reports

Patient A. On August 26, LACDPH was notified of a suspected measles case in an adolescent boy (patient A) at a local hospital. Patient A was a newly arrived refugee aged 15 years with no documented measles vaccination who had experienced a fever on August 21, followed by a rash on August 22 (Figure). He had not reported his symptoms to an International Organization for Migration (IOM) medical provider in Malaysia. The patient's accompanying family members (his mother and two brothers, aged 13 and 16 years) were asymptomatic. Although the patient's older brother had a febrile rash illness on August 18, he was healthy at the time of travel. The family had departed Malaysia for Los Angeles International Airport on August 24, arriving the same day; an IOM medical officer also was on the flight. On arrival, the family and other refugees were bused to a local motel.

The following morning, patient A's ongoing symptoms prompted ambulance transfer to a local emergency department (ED), where he remained, not in isolation, for approximately 8 hours. That evening he was transported by ambulance to another hospital ED, where he was isolated when measles was suspected. LACDPH was notified on August 26, and patient A's family members were instructed to isolate themselves at the motel. Although dengue fever was suspected at both EDs, on August 30 the patient was confirmed to have measles by serology and nucleic acid amplification testing (NAAT) performed by CDPH. Serologic testing of his older brother (who also had no documented measles vaccination) also indicated recent measles infection. Patient A's symptoms resolved, and he was

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

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discharged on September 1. He and his family members, who remained asymptomatic, were cleared to travel to Wisconsin the next day in accordance with their resettlement plan.

LACDPH and CDPH interviewed 97 contacts of patient A, including family members, fellow passengers on the flight and bus, ambulance staff members, motel guests, Los Angeles-based IOM staff members, and contacts at both EDs. Contacts were interviewed regarding their measles history, immunocompromised status, recent air travel, and current symptoms consistent with measles. Contacts were reinterviewed repeatedly during the 21-day incubation period following their potential measles exposure to assess for development of symptoms consistent with measles. Contacts also were asked to provide proof of measles immunity; if documentation could not be provided, health officials arranged for serologic tests to be performed. Among the 97 contacts, laboratory testing at LACDPH and CDPH identified three cases that met the National Notifiable Diseases Surveillance System measles case definition (*3*). Viral genotyping confirmed that all four patients were infected with viruses of genotype D9, a type commonly circulating in Malaysia (*4*).

Patient B. On the August 24 Kuala Lumpur–Los Angeles flight, a U.S.-born girl aged 12 months (patient B) was seated nine rows from patient A; she had boarded the plane during a stopover in Taiwan, which has low measles incidence. Patient B's first MMR vaccine dose was administered at a routine well-baby evaluation near her home in Los Angeles County on August 29, 5 days after arrival. She had a fever the next day, followed by a rash on August 31. Measles was confirmed by NAAT on September 9. Twelve contacts of patient B, including family members and pediatrician office contacts, were interviewed during the resulting contact investigation.

Patient C. Also seated nine rows from patient A on the August 24 Kuala Lumpur–Los Angeles flight was an unvaccinated, Indonesia-born girl aged 19 months (patient C) who was visiting family members in Los Angeles County. On August 30, patient C's family was instructed to remain under home quarantine, given the girl's known measles exposure. Patient C then had a fever on September 1, but her family did not report this symptom to LACDPH during an interview that day, nor was it disclosed that on the same day, patient C and her parents were traveling by chartered bus to Las Vegas, Nevada. Patient C and her family stayed at two Las Vegas hotels before returning to Los Angeles by rental car on September 3 (the same day patient C developed a rash) and attending church the next day. On September 6, a family member reported patient C's symptoms and the recent Las Vegas trip to LACDPH officials. Despite repeated LACDPH instructions to remain at home, patient C and her family visited a pediatrician on September 7. Measles was confirmed on September 9 by NAAT. Patient C could have been exposed to measles in Indonesia, where genotype D9 also circulates (*4*), but her exposure to a known case and timing of illness made transmission from patient A more likely. LACDPH investigated 79 contacts of patient C, including family members, chartered bus passengers, church attendees,

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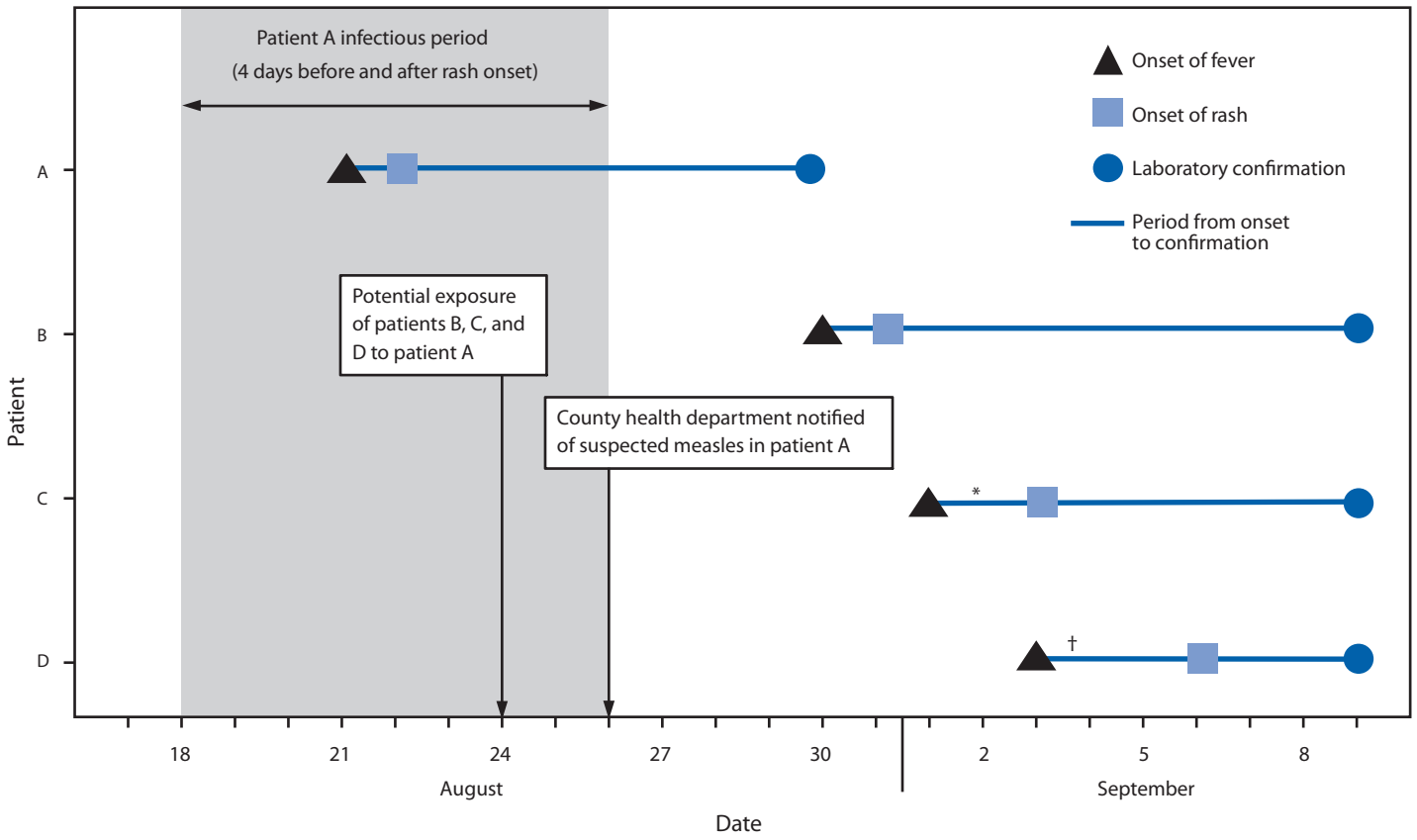
FIGURE. Timeline for onset of fever and rash and laboratory confirmation of measles in patient A and three contact patients (B, C, and D) — Los Angeles County, California, August–September 2011



* Patient C traveled out of state during September 1–3, while infectious.
† Patient D reported to work during September 2–4, while infectious.

and pediatrician office contacts. A separate investigation of Las Vegas contacts was conducted by Nevada health officials; details from that investigation are not included in this report.

Patient D. Processing patient A on his arrival at the airport on August 24 was a U.S. Customs and Border Protection officer (patient D) aged 25 years, who developed a fever on September 3 and a rash on September 6. He visited a local ED, where measles was suspected. Measles was confirmed on September 9 by NAAT. Patient D had no documented history of MMR vaccination. Serology was positive for measles immunoglobulin G and immunoglobulin M on September 13, although rubella immunoglobulin G was negative, indicating either no previous MMR vaccination or an inadequate immunologic response. Although infectious and experiencing a fever, patient D reported to work during September 2–4. A total of 110 contacts of patient D were interviewed, including family members, friends, employees at a restaurant where patient D dined while ill, hospital contacts, and airport employees. A national alert was posted on CDC's *Epi-X* for travelers processed by patient D while he was infectious. Five other customs officers reported measles-like prodromal illness, which was not confirmed as measles but required LACDPH investigation and resulted in time off from work.

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Editorial Note

Measles, which is spread via the respiratory route, including airborne transmission, is a highly infectious disease. Two doses of MMR vaccine, a highly effective regimen (>95%) in preventing measles, are recommended routinely for children and for certain adults who lack evidence of measles immunity and who are at greater risk for exposure, including health-care personnel, international travelers, and students at post–high

school educational institutions (*5*). In the United States, a first dose of MMR vaccine routinely is recommended for children at age 12–15 months, with a booster dose at age 4–6 years. However, because of the increased risk for exposure, a first dose is recommended at age 6–11 months for infants who will be traveling internationally, followed by a second dose at 12–15 months and the booster at age 4–6 years (*6*).

A gap in refugee vaccination policy was identified during this investigation. Recent measles outbreaks have been associated with international travel by unvaccinated, infectious travelers (*7–10*), who can include refugees. Los Angeles International Airport is a major U.S. port of entry for international travelers, processing approximately 5 million arriving international passengers during 2010,* including refugees. Existing regulations do not require refugees to receive any vaccine before U.S. arrival, but the outbreak described in this report might have been prevented if patient A and his family members had received measles vaccination before emigration. In response to this outbreak, MMR vaccine now is being provided for refugees traveling from Malaysia to the United States (*2*).

This outbreak also identified potential gaps in immunization requirements of workers who interact with arriving refugees. Documentation of employee measles immunity is not uniformly required for employment as a federal airport officer. Having an employee vaccination policy in place with implementation oversight could be beneficial in increasing immunization coverage and reducing transmission of vaccine-preventable diseases among workers who routinely are exposed to incoming international travelers. In 2007, a Detroit airport officer contracted measles from an ill international traveler and possibly transmitted it to another airport worker (*8*), underscoring that disease transmission can occur at any international airport.

Delays in reporting of patient A to LACDPH contributed to this outbreak. CDC requires that certain illnesses noted during travel, including fever and rash, be reported by airline staff members to the quarantine station with jurisdiction; federal airport staff members also are requested to report this information. The index patient had onset of fever on August 21 and onset of rash on August 22. However, the CDC Los Angeles Quarantine Station was not notified of an ill passenger on the August 24 flight from Malaysia. LACDPH was not informed of the suspected measles case until 2 full days after patient A had arrived in the United States and spent time in a major airport, motel, and hospital ED while infectious. Dengue fever had been considered as a diagnosis before measles. Earlier suspicion and reporting of measles to health officials might have limited the extent of community exposure to measles, enabled provision of MMR vaccination to contacts without evidence of measles immunity, and allowed health officials to enhance surveillance sooner. Measles should be considered in the differential diagnosis for any patient with a febrile rash illness with recent international travel; patients with suspected measles should be reported immediately to local public health authorities and isolated until measles is ruled out.

What is already known on this topic?

Widespread use of measles-mumps-rubella (MMR) vaccine has resulted in elimination of indigenous measles circulation in the United States. However, sporadic outbreaks of measles continue to occur in the United States, typically linked to imported cases from countries where measles remains endemic.

What is added by this report?

An ill passenger arriving in Los Angeles from Malaysia was linked to cases of measles in two passengers on the same flight and a U.S. Customs and Border Protection officer. The index patient had never been vaccinated against measles and was emigrating to the United States. Fifty health officials interviewed 298 contacts in the resulting investigation. Delayed diagnosis and notification of health officials precluded the use of MMR vaccination for outbreak containment.

What are the implications for public health practice?

Measles should be considered in the differential diagnosis of any febrile rash illness in a patient with recent international travel; in suspected cases, health authorities should be notified immediately and the patient isolated. Widespread MMR vaccination is a highly effective way to limit illness and complications from measles.

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CDC Grand Rounds: Newborn Screening and Improved Outcomes

Newborn screening is the practice of testing every newborn for certain harmful or potentially fatal conditions, such as hearing loss and certain genetic, endocrine, and metabolic disorders that typically are not otherwise apparent at birth. Newborn screening in the United States began in the 1960s. Universal newborn screening has become a well-established, state-based, public health system involving education, screening, diagnostic follow-up, treatment and management, and system monitoring and evaluation (*1*). Each year, >98% of approximately 4 million newborns in the United States are screened (*2,3*). Through early identification, newborn screening provides an opportunity for treatment and significant reductions in morbidity and mortality (*2,3*).

Uniformity of Newborn Screening

In 2006, The American College of Medical Genetics (ACMG), under the aegis of the Health Resources and Services Administration (HRSA), convened a group of experts to address the substantial variation in the number of disorders screened for in each state. The experts evaluated scientific and medical information related to screened conditions and recommended a uniform screening panel of 29 core (or primary) conditions to be included in state newborn screening panels: 20 inborn errors of metabolism, three hemoglobinopathies, and six other conditions (*4*). This panel was endorsed by the Advisory Committee on Heritable Disorders in Newborns and Children (ACHDNC) and designated by the Secretary of the U.S. Department of Health and Human Services as a national standard for newborn screening programs (*4*). Its adoption has led to increased uniformity of screening in the United States and its territories (Figure 1) (*2,3*). Additional conditions for screening continue to be identified and nominated for inclusion in the panel.

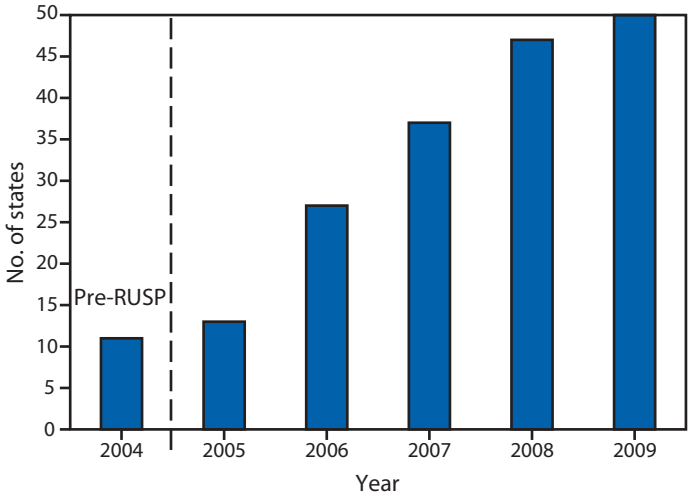
Expansion of Newborn Screening

ACHDNC reviews nominations of conditions to be included in the uniform panel. The committee encourages nomination by persons and organizations with expertise on the condition being nominated. The nomination process is transparent, allows for public commentary, and follows a systematic protocol for evidence-based review (*5*). Since adoption of the core panel of 29 conditions, nine additional conditions have been submitted and reviewed. ACHDNC recommendations to include two of the conditions, severe combined immunodeficiency and critical congenital heart disease, into the uniform newborn screening panel were approved by the Secretary in 2010 and 2011, respectively. Six of the conditions submitted for inclusion have been forwarded for an external review, and four have been referred back to nominators for additional studies.

Public Health Burden

Of the 4 million infants who are screened each year, approximately 12,500 are diagnosed with one of the 29 core conditions of the uniform screening panel. The five most commonly diagnosed conditions in the United States are 1) hearing loss, 2) primary congenital hypothyroidism, 3) cystic fibrosis, 4) sickle cell disease, and 5) medium-chain acyl-CoA dehydrogenase deficiency (Table) (*3,6*). Newborn screening can help prevent death or disability, if treatment follows (*1,3*). Each year, for example, one in 2,000 newborns is diagnosed with congenital hypothyroidism. Screening followed by thyroid hormone treatment can prevent intellectual disability (intelligence quotient [IQ] score <70) (*7,8*). Congenital hearing loss occurs in one to three newborns per 1,000 live births. Each year, newborn hearing screening identifies hearing loss in >5,000 infants. Without screening, these children might have delayed language acquisition, low educational attainment, increased behavior problems, decreased psychosocial well-being, and poor adaptive skills (*9*). Untreated phenylketonuria can result in severe cognitive impairment. Prompt initiation of treatment following newborn screening is essential for optimal development and prevention of disability (*10*).

FIGURE 1. Number of states screening for the core bloodspot conditions in the Recommended Uniform Screening Panel (RUSP) — United States, 2004–2009



Source: Data reported from National Newborn Screening and Genetics Resource Center. Available at http://genes-r-us.uthscsa.edu.

TABLE. Estimated number of cases among U.S. children identified in 2006 with disorders listed in the Recommended Uniform Screening Panel,* based on incidence of these disorders in four state newborn screening programs during 2001–2006,† and number diagnosed with hearing loss in 2009§

Disorder	Estimated no. of cases
Hearing loss	5,073
Primary congenital hypothyroidism (excluding secondary, transient, or other)	2,156
Cystic fibrosis (including nonclassical)	1,248
Hemoglobin SS (sickle cell anemia)	1,128
Hemoglobin SC (sickle C disease)	484
Medium-chain acyl-CoA dehydrogenase deficiency	239
Classical galactosemia (GALT) plus variant (excluding GALK and GALE)	224
Phenylketonuria (PKU), including clinically significant hyperphenylalaninemia variants	215
Congenital adrenal hyperplasia (excluding non 21-hydroxylase deficiency)	202
Hemoglobin S/β thalassemia	163
3-Methylcrotonyl-CoA carboxylase deficiency	100
Carnitine uptake defect	85
Very long-chain acyl-CoA dehydrogenase deficiency	69
Biotinidase deficiency (including partial)	62
Methylmalonic acidemia (mutase deficiency)	50
Glutaric acidemia type I	38
Isovaleric acidemia	32
Maple syrup urine disease	26
Citrullinemia type I	24
Propionic acidemia	15
Long-chain 3-hydroxyacyl-CoA dehydrogenase deficiency	13
Methylmalonic acidemia CblA,B	12
Homocystinuria	11
Argininosuccinic acidemia	7
Beta-ketothiolase deficiency	7
Hydroxymethylglutaric aciduria	3
Multiple carboxylase deficiency	3
Trifunctional protein deficiency	2
Total	**11, 691**

* One of the 29 disorders listed in the screening panel (tyrosinemia type 1), and two recently approved additions (severe combined immunodeficiency and critical congenital heart disease) are not included in this table. Listing available at http://www.hrsa.gov/advisorycommittees/mchbadvisory/heritabledisorders/recommendedpanel/index.html.

† The four states were California, Massachusetts, North Carolina, and Wisconsin. Source: CDC. Impact of expanded newborn screening—United States, 2006. MMWR 2008;57:1012–5.

§ Estimated number of U.S. cases of hearing loss was obtained from CDC Early Hearing Detection and Intervention Program annual data. Available at http://www.cdc.gov/ncbddd/hearingloss/ehdi-data2009.html.

Assessing the health benefits and return on investment of newborn screening has its challenges, given the diversity of conditions and their varying outcomes. Overall, screening and treating disabling conditions can reduce health-care costs. The conditions on the uniform newborn screening panel, with the exception of hearing loss and critical congenital heart disease, all are detected by dried blood spot screening. The cost of the U.S. newborn blood spot screening system was assessed by the U.S. Government Accountability Office in 2003 at $120 million per year, or $30 per infant (*11*). For congenital hypothyroidism alone, the most recent estimate of the annual cost of testing is $5 per infant, or $20 million for the entire country (*12*). The potential health benefit of testing 4 million infants for congenital hypothyroidism is the prevention of 160 cases of intellectual disability and, among 1,010 infants in whom milder impairments (i.e., IQ scores lower than expected for the population) were prevented, a total gain of nearly 15,000 IQ points (*8*).

Laboratory expertise for newborn screening tests. Most newborn screening is conducted by state health laboratories, which follow prescribed procedures to ensure high-quality screening and communicate results and information with other segments of the newborn screening system, such as hospitals and health-care practitioners. They also play an important role in conducting translational research by identifying and designing new screening tests and focusing on quality improvement of current screening tests. Their challenges include an environment of restricted state budgets, an increase in the number of new conditions that need to be detected, and the need to stay current with evolving technologies and automate processes to reduce cost.

CDC works with state and regional newborn screening laboratories to develop and improve the quality of screening tests. CDC administers the Newborn Screening Quality Assurance Program, which includes all U.S. laboratories involved in newborn screening and >450 international laboratories. This is the only program that addresses quality issues of dried blood spot measurements for all conditions for which newborn screening is available in the United States. The program provides proficiency testing, training, support, technical assistance, and consultation to participating laboratories.

Long-term follow-up. The goal of long-term follow-up is to improve the quality of care for children with diagnosed disorders so that they receive timely, appropriate care (*13*). Strategies for comprehensive long-term follow-up include coordination of multidisciplinary care through a child's medical home,* monitoring physical and psychosocial outcomes, improving family and provider access to information, establishing evidence-based best practices, and improving quality and timeliness of follow-up, diagnosis, and treatment and management through health information technology. Long-term follow-up is used to assess the needs of patients and families regarding disease management, treatment, and age-appropriate preventive care. Long-term follow-up can provide invaluable data to guide treatment through the development of care guidelines and clinical decision support. In the United States, however,

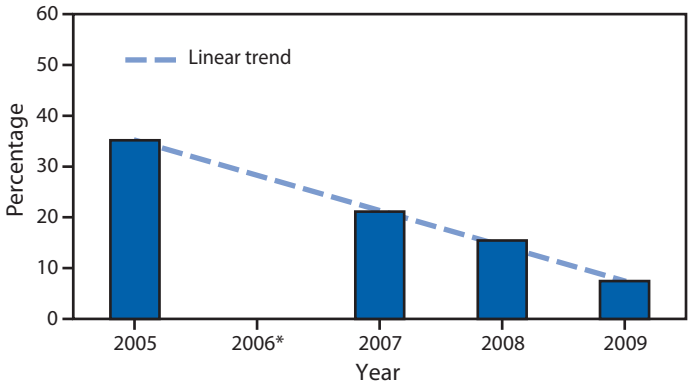
* Defined as a partnership between a child, a child's family, and the pediatric-care team who oversees the child's health and well-being and works to ensure that all of the medical and nonmedical needs of the patient are met. The medical home is a model of delivering care that is accessible, continuous, and comprehensive.

newborn screening resources often are focused on diagnosis and short-term follow-up, and long-term follow-up among state programs varies considerably. A 2005 survey of state newborn screening programs found that only 56% routinely conduct systematic long-term follow-up (*14*).

Data systems and tracking for follow-up and management of disorders. Improvement of data quality in overall tracking and surveillance systems is needed to track the clinical outcomes of affected children more effectively and to refine protocols for short-term and long-term follow-up of children with conditions identified through newborn screening. For example, newborn screening for hearing loss increased from 46.5% in 1999 to 96.9% in 2008, but data on follow-up testing are lacking. In 2009, nearly 45% of infants who did not pass screens lacked documentation of a follow-up assessment (*6*). The Indiana newborn hearing screening program is exemplary for its web-based tracking and surveillance system, which includes follow-up reminders and quality improvement activities. Indiana has shown a dramatic decrease in the percentage of infants who are lost to follow-up and documentation, from 35% in 2005 to 7% in 2009 (*6*) (Figure 2).

Data transmission between clinical care and public health systems is needed to improve follow-up and management. CDC, HRSA, the National Institutes of Health, and the National Library of Medicine are working with state programs and clinicians to describe common variables and standardize data collection procedures to enable different segments of the newborn screening system to share information. Another challenge is that states might differ in the case definitions they use for newborn screening disorders. To create multistate datasets for newborn screening disorders, federal agencies are collaborating with clinicians to develop standardized case definitions for use in state and national newborn screening data collection.

FIGURE 2. Infants lost to follow-up and documentation after hearing screening — Indiana, 2005–2009



* Data for 2006 were incomplete because of changes in the program.

Building partnerships. The need for improvements in long-term follow-up provides opportunities for partnerships at the national, state, and local levels. National partnerships provide a forum for health-care providers, public health professionals, and families to collaborate on newborn screening issues such as data collection, education, laboratory services, and clinical care. At the state and local level, partnerships should be established among state newborn screening programs, Title V programs, professional societies, and health-care providers. Resources to support these partnerships include the HRSA-funded Regional Genetic and Newborn Screening Services Collaboratives, the National Institutes of Health-funded Newborn Screening Translational Research Network, the Genetic Alliance, the National Newborn Screening and Genetics Resource Center, and the National Center on Hearing Assessment and Management. Initiatives designed to improve quality and develop the evidence base for treatment include the Newborn Screening ACTion Quality Improvement Innovation Network and the Newborn Screening Education in Quality Improvement for Pediatric Practice course, which include decision support tools for the clinical practice and education of primary-care providers, assisting them in identifying and closing gaps in care. Learning collaboratives, such as the National Initiative for Children's Healthcare Quality/Maternal Child Health Bureau project, have been developed to help state programs improve hearing screening services and enhance data collection and registries.

Summary

Although newborn screening capabilities have improved and expanded significantly in the past decade, several critical gaps and challenges remain. Clinical challenges include a shortage of experts trained to diagnose and manage conditions detected by newborn screening. Laboratory gaps and opportunities center on detection of multiple conditions using a single test, expansion of automation to reduce testing costs, and extension of new molecular methods to all disorders. General challenges include a lack of public education and understanding about the value of newborn screening that could be improved by deeper engagement of consumers in newborn screening policy and program development. Advocacy organizations can assist with raising awareness of newborn screening and can provide disease-specific education to the public. In 2009, HRSA awarded a cooperative agreement to Genetic Alliance, a consumer advocacy group, to develop a newborn screening clearinghouse. The clearinghouse was launched in September 2011 as an online resource[†] that provides information on newborn

[†] Available at http://www.babysfirsttest.org.

screening, the conditions the tests identify, and screening information for all 50 states, the District of Columbia, Puerto Rico, and U.S. territories. This is a national level resource providing comprehensive education for families. Continued collaboration among partners provides an excellent opportunity to enhance laboratory and data systems through quality assurance, surveillance, tracking, and research to improve screening techniques, better guide follow-up of affected children, and optimize outcomes.

Given all these challenges and opportunities, screening itself clearly is not enough. It is critical to avoid complacency in assuming that every newborn who is screened will receive optimal service and care. Short-term follow-up and management of children with disorders and long-term follow-up activities within the entire newborn screening system are central to realizing the promise of newborn screening.

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Licensure of 13-Valent Pneumococcal Conjugate Vaccine for Adults Aged 50 Years and Older

In 2010, 13-valent pneumococcal conjugate vaccine (PCV13 [Prevnar 13, Wyeth Pharmaceuticals, Inc., a subsidiary of Pfizer, Inc.]) was licensed by the Food and Drug Administration (FDA) and recommended by the Advisory Committee on Immunization Practices (ACIP) for children aged 6 weeks through 71 months for the prevention of invasive pneumococcal disease (IPD) caused by the 13 pneumococcal serotypes included in the vaccine. PCV13 currently is recommended as a 4-dose series for children starting at age 2 months. On December 30, 2011, FDA approved PCV13 for prevention of pneumonia and invasive disease caused by PCV13 serotypes among adults aged 50 years and older. This report summarizes data on the immunogenicity and safety of PCV13 in adults and outlines key additional evidence requested by ACIP to formulate recommendations for its use.

FDA approved PCV13 for an adult indication under the Accelerated Approval pathway, which allows the agency to approve products for serious or life-threatening diseases on the basis of early evidence of a product's effectiveness that is "reasonably likely to predict clinical benefit" (*1*). Approval of PCV13 for adults was based on immunogenicity studies that compared antibody responses to PCV13 with antibody responses to 23-valent pneumococcal polysaccharide vaccine (PPSV23, [Pneumovax 23, Merck, Inc.]), a vaccine that provides protection against IPD but for which no consensus exists regarding protection against nonbacteremic pneumococcal pneumonia (*2*). Of note, the level of vaccine-induced pneumococcal antibody in adults that correlates with protection against clinical disease, including IPD or pneumococcal pneumonia, has not been established.

In two randomized, multicenter, immunogenicity studies conducted in the United States and Europe, adults aged 50 years and older received a single dose of PCV13 or PPSV23 (*3*). Functional antibody responses were measured 1 month after vaccination using an opsonophagocytic activity (OPA) assay. In adults aged 60 through 64 years, PCV13 elicited OPA geometric mean antibody titers (GMTs) to the 12 serotypes common to both vaccines that were comparable to, or higher than, responses elicited by PPSV23. For serotype 6A, which is unique to PCV13, OPA antibody responses were higher after PCV13 vaccination than after PPSV23 vaccination. OPA GMTs elicited by PCV13 in adults aged 50 through 59 years for all 13 serotypes were comparable to the corresponding GMTs elicited by administration of PCV13 in adults aged 60 through 64 years. In adults aged 70 years and older who previously had been immunized with a single dose of PPSV23 at least 5 years before enrollment, PCV13 elicited OPA responses that were comparable to or higher than those elicited by PPSV23 for the 13 serotypes. For 10 of 12 serotypes in common, the PCV13 responses were significantly greater than the PPSV23 responses. At 1-year follow up, OPA levels were lower in PCV13 and in PPSV23 recipients than at 1 month. An evaluation of responses after a second pneumococcal vaccination administered 1 year after the initial study doses showed that a second dose of PCV13 generally resulted in OPA levels similar to those observed after the first dose. In contrast, subjects who received PPSV23 as the initial study dose had lower OPA antibody responses after subsequent administration of PCV13 than those who had received PCV13 as the initial dose, regardless of the level of the initial OPA response to PPSV23 (*3*).

Safety of PCV13 was evaluated in approximately 6,000 PPSV23-naïve and PPSV23-experienced adults aged 50 years and older (*3*). Overall incidence of serious adverse events reported within 1 month of an initial study dose of PCV13 or PPSV23 ranged from 0.2% to 1.7%. From 1 month to 6 months after an initial study dose, the overall incidence of serious adverse events ranged from 1.2% to 5.8% among persons vaccinated with PCV13 and 2.4% to 5.5% among persons vaccinated with PPSV23. Rates of serious adverse events reported between the treatment groups were similar among studies that enrolled PPSV23-naïve subjects and studies that enrolled PPSV23-experienced subjects. Common adverse reactions reported with PCV13 were pain, redness, and swelling at the injection site; limitation of movement of the injected arm; fatigue; headache; chills; decreased appetite; generalized muscle pain; and joint pain. Similar reactions were observed in adults who received PPSV23.

At the February and June 2011 meetings of ACIP, published and unpublished data were presented on the epidemiology of pneumococcal disease and PCV13 safety and immunogenicity (*4*). Two critical gaps in evidence needed to support a recommendation for routine PCV13 use among adults were identified. First, no available data demonstrated clinical efficacy of PCV13 against pneumococcal pneumonia in adults. As part of FDA's accelerated approval process, the manufacturer has agreed to conduct further studies to verify the anticipated benefit of the vaccine (*1*). To this end, a trial in 85,000 persons aged 65 years and older who have never received PPSV23 is under way in the Netherlands to assess the clinical benefit of PCV13

in the prevention of pneumococcal pneumonia (*5*). Second, the full impact of routine PCV13 vaccination among children on the incidence of pneumococcal disease caused by PCV13 serotypes in adults is not known at this time. Substantial reductions in incidence of pneumococcal disease caused by serotypes in the 7-valent pneumococcal conjugate vaccine (PCV7 [Prevnar, Wyeth]) were noted among adults after routine vaccination of children with PCV7 began in 2000 (*6*). PCV13 serotypes currently account for approximately one third of IPD among adults aged 65 years and older (CDC, unpublished data, 2010). In addition, 11 serotypes that account for 25% of IPD in adults aged 65 years and older are included in PPSV23 but not in PCV13. If indirect effects of similar magnitude to that of PCV7 are observed from the introduction of PCV13 in 2010, the potential benefit of vaccinating adults with PCV13 is likely to be reduced substantially. National surveillance systems monitoring pneumococcal infections are tracking the impact of the pediatric PCV13 program and will measure the magnitude of indirect effects on adults. The results of the clinical trial in the Netherlands and the extent of indirect effects of the infant PCV13 program will provide critical information that will help guide ACIP deliberations regarding routine PCV13 use among adults aged 50 years and older; both pieces of information are expected to be available in 2013.

At this time, two vaccines for prevention of pneumococcal disease are licensed for use in adults. ACIP currently recommends a single dose of PPSV23 for all persons aged 65 years and older. In addition, for adults aged 19 through 64 years, PPSV23 should be administered to those with immunocompromising conditions (including chronic renal failure or nephrotic syndrome); those with functional or anatomic asplenia; those who are immunocompetent and have chronic conditions such as alcoholism, diabetes mellitus, or chronic lung disease; those who are smokers; and those with cochlear implants or cerebrospinal fluid leaks (*2*). Adults who received PPSV23 before age 65 years for any indication should receive another dose of the vaccine at age 65 years or later if at least 5 years have passed since their previous dose. A second dose of PPSV23 is recommended 5 years after the first dose for persons aged 19 through 64 years with functional or anatomic asplenia and for persons with immunocompromising conditions. ACIP does not recommend routine revaccinations with PPSV23 because of insufficient data regarding clinical benefit, particularly the degree and duration of protection, and safety (*2*). Although not yet recommended by ACIP, PCV13 is available for use among adults aged 50 years and older in accordance with the package insert.

ACIP will continue to review evidence as it becomes available to guide development of a recommendation regarding routine use of PCV13 in adults aged 50 years and older. In the meantime, health-care providers should continue to administer PPSV23 in accordance with current recommendations. According to recent data, at least one third of persons aged 65 years and older have not received the recommended dose of PPSV23, indicating a need to continue to improve vaccination coverage in this population (*7*). At the June 2012 meeting, ACIP will discuss available evidence regarding administration of PCV13 to adults with immunocompromising conditions who are at high risk for developing pneumococcal disease.

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Notes from the Field

False-Positive Measles Test — Maine, February 2012

On February 7, 2012, the Maine Center for Disease Control and Prevention was notified of suspected measles infection in an unvaccinated woman aged 57 years. The patient went to her medical provider on January 30 after 3 days of headache and fever and 2 days of papular rash. The rash began on her neck and spread to her abdomen, legs, and back. Two days later she developed coryza and cough. The rash resolved by February 6. A serum specimen collected on January 31 demonstrated a high titer of measles immunoglobulin M (IgM) and was positive for measles immunoglobulin G (IgG) on testing at a reference laboratory.

An epidemiologic investigation conducted after initial laboratory testing did not find a likely source of measles exposure. The patient reported a history of measles in childhood. Of note, 1–2 weeks before illness onset she was exposed to her grandson, who had parvovirus infection. Serum and nasopharyngeal swabs were collected on February 7 for repeat testing at the Maine Health and Environmental Testing Laboratory. Direct-capture measles IgM and polymerase chain reaction test results were negative at the state laboratory. After learning of the patient's parvovirus exposure and with the knowledge that some measles IgM testing had provided false-positive results (*1*), the Maine Center for Disease Control and Prevention requested parvovirus testing of the original serum specimen at the reference laboratory. Parvovirus testing demonstrated a high titer of parvovirus IgM but was negative for parvovirus IgG, consistent with recent infection.

This case highlights the importance of careful epidemiologic investigation to guide appropriate laboratory testing and the crucial role of state public health laboratories in confirming or ruling out infectious diseases of public health concern. In this investigation, the history of measles infection in childhood, lack of a recent likely source of measles exposure, and recent exposure to parvovirus made measles a less likely cause of illness, despite the initial reference laboratory test results. The state laboratory was able to perform a direct-capture IgM test quickly and rule out measles, eliminating the need for an intense and costly public health response. Parvovirus should be considered in the differential diagnosis of acute febrile rash illness, even in the setting of positive measles IgM, when clinical information is compatible and epidemiologic investigation suggests low probability of measles infection.

Reported by

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Errata

Vol. 60, No. 29 and Vol. 59, No. 27

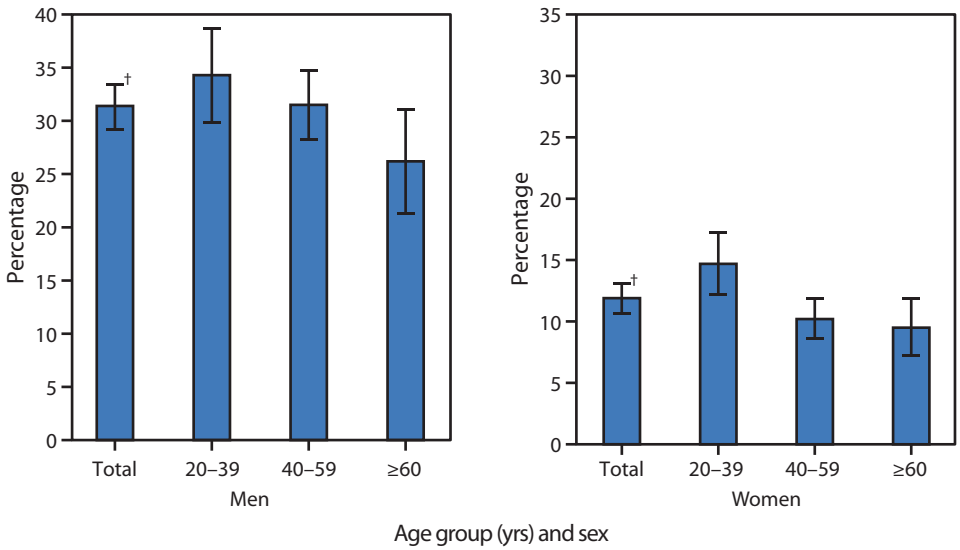
In the report, "Characteristics Associated With Seasonal Influenza Vaccination of Preschool Children — Oregon, 2006–2008," on page 981, in the second column, the first sentence of the second paragraph should have read, "The weighted response rate for PRAMS was 75.2% and for PRAMS-2 was **43.5%** of the original PRAMS sampling frame."

In the report, "Television and Video Viewing Time Among Children Aged 2 Years — Oregon, 2006–2007," on page 837, the last complete sentence in the second column should have read, "The Oregon PRAMS-2 weighted survey response rate was **39.3%** during 2006 and **47.7**% during 2007."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Prevalence of Low Levels of High-Density Lipoprotein (HDL) Cholesterol* Among Adults Aged ≥20 Years, by Age Group and Sex — National Health and Nutrition Examination Survey, United States, 2009–2010



* A low level of HDL cholesterol is defined as <40 mg/dL.
† 95% confidence interval.

A low level of HDL cholesterol is considered a risk factor for cardiovascular disease. During 2009–2010, approximately 31% of men and 12% of women had low levels of HDL cholesterol. The percentage of adults with low HDL cholesterol declined with age for men and women.

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