

Measles at Disneyland, a Problem for All Ages

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Measles is once again capturing headlines in the United States. Even though only a small portion of the U.S. population is susceptible, international travel, vaccine refusal or delay, and rare vaccine failures combined with high social contacts allow the highly infectious measles virus to infect susceptible individuals of all ages (1). The story of an unvaccinated child or adolescent contracting measles while traveling abroad and transmitting the virus to others upon return to the United States has been repeated many times in recent years. The 2014–2015 Disneyland-associated outbreak has captured public attention because infants too young to receive the vaccine and children with true medical contraindications to vaccination became infected (2). In addition, Disneyland employees contracted measles and possibly contributed to disease transmission. In 2014, there were 23 measles outbreaks and more than 644 cases of measles (2). More outbreaks owing to vaccine refusal will undoubtedly occur because of sufficient numbers of susceptible individuals in many areas.

Several factors have contributed to parents' refusal to vaccinate their children, and rates of refusal have increased in some states in recent years (3). In addition, although great progress has been made in controlling measles globally, it has recently rebounded in many countries (1). In Europe, where most countries do not require measles or other immunizations for children to attend schools, more than 10 000 cases of measles have been reported each year for several years. The flawed and fraudulent study published in 1998 claiming that the measles-mumps-rubella (MMR) vaccine caused autism has contributed to the hesitancy to vaccinate and the resurgence of measles (1, 3, 4) over the 12 years before the study was retracted. However, even after the study was proven to be based on fabricated data, and numerous reviews and reports in the responsible press discredited the study, fears linger. It is hoped that the recent encouragement by Autism Speaks for parents to vaccinate their children should help increase rates (5).

The relative absence of measles in most areas of the United States for many years has led to an underappreciation of measles-related complications and mortality that occurs at all ages and in all countries, including the United States. A review of more than 67 000 reported cases of measles in the United States from 1987 to 2000 found that complications include otitis media, pneumonia, diarrhea, and encephalitis in children younger than 5 years and that hospitalization for measles complications was required for approximately 25% of infected children (6). The complication rates are lowest among children and adolescents aged 5 to 19 years, but the rate of complications increases

after adolescence, and hospitalization and mortality rates are highest in persons 30 years of age or older (6). In fact, case-fatality rates in adults 30 years of age or older are higher than those in children younger than 5 years.

Much can be done to prevent these outbreaks. Children younger than 12 months of age (the recommended age for the first dose of MMR) and those with medical contraindications depend on high levels of immunity in the rest of the population to provide "community protection," sometimes referred to as "herd immunity." These individuals are not immune to measles and will remain susceptible during outbreaks. Parents should be able to take all children to Disneyland and other public places without the fear of measles exposure. Some have proposed removing religious, philosophical, and/or personal belief exemptions to school laws, but enacting these changes could inflame public opinion against immunizations (3, 7). How can adult primary care clinicians assist their pediatric colleagues in boosting community protection? They should routinely review immunization records as they see new patients who are transitioning from pediatric care. The current Advisory Committee on Immunization Practices recommendations advise immunization for potentially susceptible individuals to help prevent future outbreaks (8). Primary care practitioners can also be sure to confirm immunization status of their patients who are health care providers or who plan to travel to other countries (including Europe) where measles is a problem (8). Primary care clinicians should also consider confirmation of immunization status of adult patients working in settings with a high likelihood of exposure to large numbers of children or international travelers, such as schoolteachers or theme park staff. Most adults do not know their detailed vaccination history or have access to their pediatric medical records. Verbal reassurance that "I had all my shots" is insufficient. The simplest thing to do if vaccine status is uncertain is to provide a dose of MMR to those without documentation of 2 doses of measles vaccine after 12 months of age (8). Although serologic testing is an option, it requires multiple visits and possible delays. Primary care physicians also need to be familiar with the clinical signs of measles and promptly report suspect cases to local health authorities to try to limit outbreaks when they do occur.

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Measles can be eradicated. However, this will take time; ramped-up efforts to ensure that eligible U.S. children are vaccinated; and greater international collaboration to improve prevention of measles in all countries, including highly industrialized countries with ongoing measles problems (1). Maintaining public trust in immunization and our immunization safety system is essential in helping parents to understand the potential adverse consequences of failure to vaccinate and that processes are in place to ensure that their children receive the safest vaccines possible. Coordinated input from all stakeholders with oversight as recommended in 2011 by the National Vaccine Advisory Committee (9) would enhance public confidence in our immunization programs. Following the framework recommended by the Institute of Medicine (10), constant surveillance and additional studies of vaccine safety to address public concerns should be a priority. Adequate funding is necessary to take advantage of the expanded use of electronic health records to conduct epidemiologic studies that identify or rule out even small postvaccination risks. Also, funding of studies to take advantage of advances in immunology and genomics can allow us to better understand the biological mechanisms for adverse events caused by vaccines and for diseases of concern. Such studies would help counter the common misperception that every illness that occurs after vaccination was caused by the vaccine.

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