

Unprotected People #72

Pertussis

Infant Dies after Contracting Pertussis from Adult Family Members

In December 2004, a 29-day-old infant died from pneumonia and respiratory failure, complications of pertussis. Several weeks before the infant's birth, her mother and maternal grandmother had developed prolonged paroxysmal cough with posttussive vomiting.

According to information published in MMWR on January 28, 2005, during 1996-2004, 35.1% of pertussis patients were 6 months of age or younger (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5403a3.htm>). Infants this age are particularly vulnerable to the disease because they are too young to have received the 3-dose primary series of pertussis vaccine.

CDC describes pertussis as a highly communicable disease, transmitted from patients to close contacts by respiratory droplets. It can be severe in nonimmunized infants; healthcare workers should suspect pertussis in nonimmunized or partially immunized infants with respiratory distress.

The following case report is based on information from a medical school, hospital, and local and state public health agencies in West Virginia, as well as from NIP staff. Titled "Brief Report: Fatal Case of Pertussis in an Infant—West Virginia, 2004," it appeared in MMWR on January 28, 2005.

Brief Report: Fatal Case of Pertussis in an Infant—West Virginia, 2004

In December 2004, an infant aged 29 days in West Virginia died from pertussis after exposure to adult family members with probable undiagnosed pertussis. Pertussis (i.e., whooping cough) is a prolonged respiratory illness caused by the bacterium *Bordetella pertussis* and characterized by a violent cough, inspiratory whoop, and posttussive vomiting. The cough often lasts from several weeks to up to 3 months. However, adolescents and adults, even those previously vaccinated as children, often have disease not recognized as pertussis,

leading to intrafamilial and nosocomial transmission. In the United States, children aged <6 months are at the highest risk for severe illness or death from pertussis because most infants do not complete their primary vaccination series until age 6 months. This report summarizes results of the West Virginia Department of Health and Human Resources (WVDHHR) case investigation, which underscore the critical need to prevent pertussis transmission to infants from adolescents and adults with undiagnosed disease.

On December 11, the infant was taken by her parents to a local emergency department (ED) with difficulty breathing. The infant had been coughing for approximately 5 days with increasing severity, resulting in posttussive vomiting and several choking episodes. At presentation, the infant was lethargic, and examination revealed tachycardia and mild fever (99.5 degrees F [37.5 degrees C]). Before intubation and oxygen supplementation, the infant had thick, foamy mucus coming from her mouth, appeared cyanotic, and had an O₂ saturation of 70% by pulse oximetry. Seizure activity was noted during intubation. Laboratory results revealed severe leukocytosis (white blood cell count: 104,100/microliter; normal: 5,000-19,500 microliter), severe lymphocytosis (26,600/microliter; normal: 2,500-16,500/microliter), and a nasopharyngeal swab was positive for respiratory syncytial virus (RSV) by rapid immunoassay alone. A chest radiograph revealed right upper lobe and perihilar infiltrates, and an electrocardiogram indicated supraventricular tachycardia. Three hours after arrival at the ED, the infant was transferred to a pediatric intensive care unit (PICU) with diagnoses of pneumonia and respiratory failure.

On transfer to the PICU, the infant was placed on droplet precautions and contact isolation, treated for

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suspected sepsis, and started on azithromycin for presumed *B. pertussis* infection on the basis of clinical signs. The infant's ventilator course was characterized by hypoxemia (admission PaO₂/FIO₂ ratio: 172) and increasing hypercarbia. Sequential cardiac ultrasounds demonstrated increasing pulmonary hypertension (right ventricular pressure: 2/3 systemic). Nineteen hours after admission, oxygenation worsened precipitously (PaO₂/FIO₂ ratio: 52-60) and failed to improve with nitric oxide administration or high-frequency ventilation. A double-volume exchange transfusion was performed, but the infant failed to improve and died approximately 30 hours after admission to the PICU.

A specimen obtained from the infant's nasopharynx after admission to the PICU was reported at the time of the infant's death to be positive for *B. pertussis* DNA and negative for *B. parapertussis* DNA by polymerase chain reaction (PCR); however, no specimen was submitted for culture. Results were negative by both rapid immunoassay and culture for RSV, influenza A and B, and parainfluenza viruses 1, 2, and 3, and negative by culture for adenovirus. The diagnosis of confirmed pertussis was based on history, clinical findings, and a positive PCR test. The infant might have had a coinfection with RSV based on the positive RSV rapid immunoassay at the ED; this result was not confirmed by a repeat RSV rapid immunoassay or by culture at the PICU.

The infant was born at 36 weeks' gestation (birth weight: 2,665 g) by normal, uncomplicated, vaginal delivery. The infant's mother, aged 20 years, had a prolonged paroxysmal cough with posttussive vomiting and whoop that began approximately 3 weeks before the infant's delivery. The cough was still present at the time of the infant's death. The mother received guaifenesin/dextromethorphan cough syrup after delivery. The infant's maternal grandmother, aged 58 years, had a prolonged paroxysmal cough illness (onset date: approximately 2 weeks before the infant's mother's illness) with posttussive vomiting; she had received azithromycin after a diagnosis of sinusitis. Two weeks before the

infant's illness, the infant's father, aged 22 years, had onset of a paroxysmal cough illness of >3 weeks' duration.

A day after the infant's death, a case investigation identified four additional close contacts (two cousins, a paternal grandmother, and a great-grandmother) of the infant with cough illness (duration: 3-8 days) at the time of the infant's death. The birth hospital and the ED had no droplet precautions in place while the infant and the infant's symptomatic family members were in the facilities; 30 birth hospital and 11 ED employees were identified as potential contacts. The local health department and the ED provided erythromycin to 24 recent (i.e., during the preceding 3 weeks) contacts of the infant and symptomatic family members. Of nine nasopharyngeal swabs submitted for culture, all were negative for pertussis (all household members swabbed had been symptomatic for >3 weeks); no PCR testing for pertussis was performed. Pertussis alerts were issued to the public, healthcare providers, schools, and a large retail store where the infant's father worked.

This case underscores the need to protect infants from pertussis transmission. The healthcare community can limit the spread of pertussis by (1) educating caretakers and the public about preventing exposure of infants to any person with a cough illness, (2) educating healthcare providers to consider pertussis in adolescents and adults with a cough illness and to ask these patients to wear a mask or isolate themselves from other patients, and (3) encouraging confirmation of pertussis by culture of nasopharyngeal secretions. Healthcare providers must be encouraged to observe droplet precautions while attending to patients with respiratory illnesses. No U.S.-licensed pertussis vaccine for persons aged ≥ 7 years is available; however, in 2004, two pharmaceutical companies submitted biologics license applications to the Food and Drug Administration for two tetanus toxoid and reduced diphtheria toxoid and acellular pertussis vaccine adsorbed (Tdap) products, one for persons aged 10-18 years and the other for persons aged 11-64 years.