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Pertussis Prevention through Appropriate Use of Tdap Vaccine

Background

Pertussis, or whooping cough, is a highly communicable respiratory disease caused by the bacterium *Bordetella pertussis*. The infection begins with a 1–2 week onset stage characterized by a runny nose, sneezing, low-grade fever and a mild cough that gradually becomes more severe.

During the 1–6 week paroxysmal cough stage, the person has bursts, or paroxysms, of numerous rapid coughs, apparently due to difficulty expelling thick mucus from the tracheobronchial tree. At the end of the paroxysm, a long inspiratory effort is usually accompanied by a characteristic high-pitched "whoop." During a paroxysm, the individual may become cyanotic; children and young infants, especially, appear very ill and distressed. Vomiting and exhaustion commonly follow the paroxysmal episode.[1] (Videos of children exhibiting pertussis paroxysms are available at: http://www.vaccineinformation.org/video/pertussis.asp.)

Recovery is gradual, with the cough becoming less paroxysmal and disappearing in 2–3 weeks. However, paroxysms often recur with subsequent respiratory infections for many months after the onset of pertussis. In the 20th century, pertussis was one of the most common childhood diseases and a major cause of childhood mortality in the United States. Pertussis incidence has been gradually increasing since the early 1980s. Almost 26,000 cases were reported in the United States in 2004, the largest number since 1959.[1] In Alaska, 159 and 91 cases of the disease were reported in 2005 and 2006, respectively.

Although generally considered a childhood disease, persons of any age can get pertussis. Immunity following the diphtheria-tetanus-acellular pertussis (DTaP) booster at age 4–5 years steadily wanes leaving virtually all adolescents and adults susceptible to pertussis. Unrecognized disease among children and adults often leads to outbreaks of pertussis. In addition, the development of PCR technology for pertussis testing has increased identification of cases.[2]

Adolescents and adults partially protected by the vaccine may become infected with *B. pertussis* but experience a milder disease than infants and young children. Even though the disease may be milder in older persons, those who are infected may transmit the disease to other susceptible persons, including unimmunized or incompletely immunized infants.

Older persons are often found to be the first individuals infected in a household with multiple pertussis cases, and are often the source of infection for children.[1]

In recent years, adolescents and adults have accounted for an increasing proportion of cases. In 2004 and 2005, ~60% of reported cases in the United States were among persons aged 11 years and older.[1]

Vaccine

Although pediatric diphtheria-tetanus-acellular pertussis vaccine (DTaP) has been available for children aged 6 years and younger for many years, acellular pertussis-containing vaccines for adolescents and adults (Tdap) were first licensed in 2005. Tdap contains a reduced amount of diphtheria toxoid compared with DTaP.

The Advisory Committee on Immunization Practices (ACIP) has issued extensive recommendations on the appropriate use of Tdap vaccine for adolescents and adults.[3,4] In general, *for adolescents and adults, a single dose of Tdap should be substituted for a previously recommended dose of tetanus-diphtheria (Td) vaccine.*

Table 1: Comparison of DTaP and Tdap Formulations by the Age Group for which each Vaccine is Licensed

Formulation	Common Name	Age Group
DTaP	Pediatric	<7 years
Tdap	Adult	11 years – 64 years*

* *Adacel*®, the sanofi Tdap vaccine distributed by the Alaska Immunization Program, is licensed for ages 11–64 years. *Boostrix*®, the Tdap vaccine produced by GlaxoSmithKline, is licensed for ages 10–18 years.

The Alaska Immunization Program began distribution of Tdap vaccine in January 2006.[5] As of September 2007, ~64,000 doses of Tdap vaccine were distributed to Alaska providers. During that same period, the Program distributed 27,300 doses of tetanus-diphtheria (Td) vaccine, meaning almost 1/3 of the tetanus-diphtheria containing vaccine distributed did not include a pertussis component. Because virtually all adolescents and adults (through age 64 years) should receive Tdap, the high proportion of Td distribution indicates many opportunities are being missed for the prevention of pertussis in Alaska.

Appropriate Vaccine Use for School Requirements and Adult Immunization

The Alaska Department of Education and Early Development has proposed regulations requiring substitution of Tdap for the Td booster currently required for students whose last tetanus-diphtheria containing vaccine was received ≥10 years previously.[6] Implementation of this regulation, combined with providers' increased attention to the appropriate use of Tdap vaccine for adolescents and adults, should help reduce pertussis morbidity in Alaskans of all ages.

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(Contributed by Laurel Wood, Immunization Program Manager, Alaska Section of Epidemiology)