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Update on Pertussis (Whooping Cough) in Alaska

Background

Pertussis is a contagious bacterial respiratory infection that typically involves a protracted cough lasting for up to 10 or more weeks. The classic symptoms of pertussis in young children include paroxysms (fits) of rapid coughs followed by a high-pitched “whoop” sound, vomiting, and exhaustion. Unvaccinated infants are at highest risk for hospitalization and death. In the pre-vaccine era, nearly all U.S. children were infected by 5 years of age, and pertussis was a major cause of childhood mortality. In the 1940s, the diphtheria, tetanus, and pertussis (DTP) whole-cell vaccine was introduced, leading to a dramatic decline in the incidence of pertussis nationally. Pertussis vaccination was first required for school entry in Alaska in 1973. Acellular vaccines that were less likely to cause reactions replaced whole-cell vaccines in 1999.

Methods

Pertussis reports received by the Section of Epidemiology (SOE) during 1974–2016 were reviewed. National case definitions were updated over time as new diagnostic tests became available.¹ Rates were calculated using Alaska census data. For cases reported during 2010–2016, vaccination histories were reviewed using Alaska’s immunization information system, VacTrAK.

Results

During 1974–2016, 2,162 pertussis cases were reported to SOE; 1,174 (54%) cases were in females; the median age was 9 years (range: 0–93 years), and 1,644 (76%) cases were in children aged ≤18 years. Of the 1,137 persons for whom race data were available, 591 (52%) were white, 417 (37%) were Alaska Native people, and 129 (11%) were another race. Two deaths were reported; both were in infants aged <2 months. The number of reported cases has increased since 2003 (Figure). Of the 918 cases among children aged 0–19 years reported during 2010–2016, 609 (66%) occurred in children who were not up-to-date on their DTaP vaccinations (Table).

Figure. Cases of Pertussis by Year — Alaska, 1974–2016

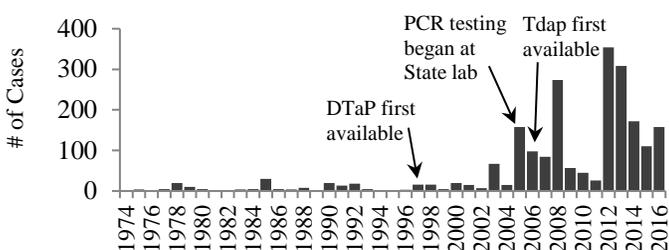


Table. Pertussis Cases in Children Aged 0–18 years, by Age Group and Vaccination Status — Alaska 2010–2016

Age Group (years)	# of AK Cases	# (%) AK Cases UTD*	AK Incidence†	U.S. Incidence†
<1	135	51 (38%)	178.4	119.7
1–6	320	67 (21%)	70.6	22.2
7–10	191	84 (44%)	9.3	29.3
11–19	272	107 (39%)	49.3	20.6
≥20	261	32 (12%)	7.0	2.6

*Up to date on their DTaP vaccination, based upon the Advisory Committee on Immunization Practices (ACIP) recommendations. †Per 100,000 population.

Discussion

Similar to national trends, pertussis cases in Alaska have increased since 2003.¹ In addition to under-vaccination, waning immunity from acellular pertussis vaccines has likely contributed to the national increase in cases.² The vaccine efficacy (VE) for DTaP drops from 98% to 71% at 1 and 5 years

(respectively) after a child’s 5th dose of the vaccine, and the VE for Tdap drops from 73% to 34% at 1 and 4 years (respectively) after a child receives one dose of the vaccine.³ The considerably higher sensitivity of polymerase chain reaction (PCR) testing has also likely contributed to higher case counts in recent years, as lab testing transitioned from culture to PCR methods in the early-2000s.^{4–6}

During 2010–2016, the incidence of pertussis in Alaska was markedly higher than the national incidence in all children except for the 7–10 year age group. This discrepancy is likely due in large part to Alaska’s low immunization coverage rates for DTaP and Tdap vaccines, as well as potentially some differences in surveillance practices. The Centers for Disease Control and Prevention (CDC) National Immunization Survey (NIS) results show that Alaska’s DTaP vaccination coverage rates among children aged 19–35 months consistently ranked in the lowest 10% nationally during 2008–2016.⁷ Moreover, Alaska’s Tdap coverage rates among adolescents were consistently ranked in the lowest 10% nationally during 2011–2015. Fortunately, according to the 2016 NIS, Alaska saw a statistically significant increase in Tdap coverage rates among adolescents (from 69.7% in 2015 to 79.4% in 2016). NIS does not assess vaccination coverage rates for adults. More work is needed to increase Alaska’s pertussis vaccination rates.

Recommendations

1. Health care providers should ensure that children receive the 5-dose series of DTaP vaccine beginning at 2 months of age. One dose of Tdap vaccine should be administered to all adolescents aged 11 through 12 years.¹
2. Adults with an unknown or incomplete history of a 3-dose primary series with tetanus and diphtheria (Td) toxoid-containing vaccines should complete the primary series that includes one dose of Tdap. Adults who have not received Tdap vaccine or for whom pertussis vaccination status is unknown should receive one dose of Tdap followed by a Td booster every 10 years.¹
3. Pregnant women should receive one dose of Tdap during each pregnancy, during gestational weeks 27–36, regardless of prior history of receiving Tdap.¹
4. When indicated by clinical presentation, obtain a nasopharyngeal swab or an aspirate specimen for pertussis testing. Testing is available at commercial laboratories and the Alaska State Public Health Laboratory.
5. Follow CDC guidelines for post-exposure prophylaxis for persons at increased risk for severe disease.⁸
6. Report suspected or confirmed cases of pertussis to SOE (7 AAC 27.005 and .007) by phone 907-269-8000 or fax 907-561-4239, using the appropriate form.

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