New Mexico Epidemiology
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# Pertussis in New Mexico

## Booster Vaccination Arrives

**Joan Baumbach, MD, MPH**
*Epidemiology and Response Division*
*New Mexico Department of Health*

Pertussis or 'whooping cough' is a highly contagious respiratory tract infection caused by the B*ordetella pertussis* bacteria. Since vaccine-induced immunity to *Bordetella pertussis* is of limited duration, many adolescents and most adults have little or no residual immunity. Most reported pertussis cases among adolescents and adults are thought to occur because of this decline in protective immunity. Infants who are too young to have been fully vaccinated are at high risk of severe and potentially life-threatening illness from exposure to persons with active disease. Pertussis vaccine led to a dramatic decrease in the incidence of the disease, from approximately 150 cases per 100,000 population pre-vaccine in the 1940s to about 1 case per 100,000 by 1980. However, pertussis disease rates have increased since 1980.

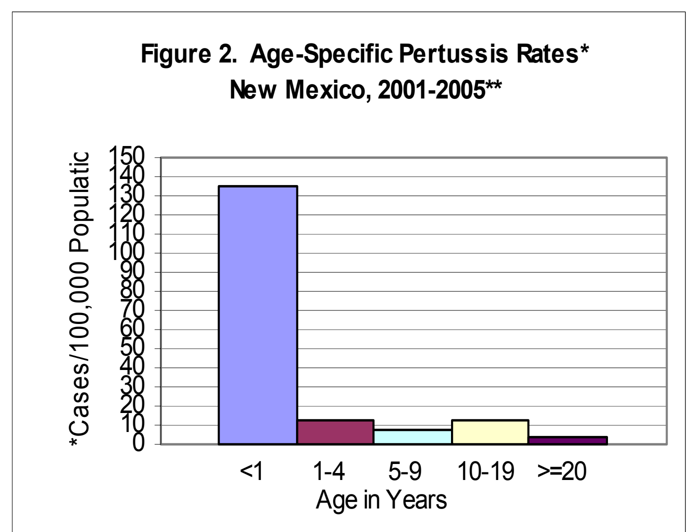
### Epidemiology of Pertussis

Whole cell diphtheria, tetanus and pertussis (DTP) vaccine was introduced in 1944. Protective efficacy of whole cell vaccine is approximately 70-90%. Acellular vaccines were licensed for the primary vaccine series in 1996. Until recently, three acellular vaccines have been licensed for use in the U.S. Efficacy of acellular vaccine is 88% (confidence interval 79-93%). Protection wanes 5-10 years after the last childhood vaccination. National epidemics of pertussis occur approximately every three to four years. U.S. pertussis cases were at a reported low of 1,020 cases in 1976; however, in 2004 a 40-year high was seen with 25,827 total cases reported; 34% (8,897) were among adolescents ages 11 through 18 years and 27% (7,008) were among adults 19 through 64 years of age. The true number of cases, estimated at 600,000 cases annually among the adult population 19-64 years of age, is thought to be significantly greater than the number actually diagnosed and reported. Pertussis-related deaths among infants in the U.S. have increased from about ten per year in the 1990s to about 20 per year during the current decade.

### Pertussis in New Mexico

Pertussis is seen throughout New Mexico in all age groups, as individual sporadic cases, family clusters and, every few years, as small and large-scale community outbreaks. Deaths among 2-month old infants who had not yet begun vaccination occurred once in each of the past three years (i.e. 2003, 2004 and 2005).

Figures 1 and 2 depict pertussis rates in NM compared with U.S. rates during 1996 - 2005 and the age distribution of reported NM cases during 2001 - 2005, respectively. Rates in White Hispanics, Native American Non-Hispanics and White Non-Hispanics in NM for 2001-2005 were 8.5, 8.4 and 7.9 per 100,000 population, respectively.




Source: National Electronic Telecommunications Systems for Surveillance (NETSS), New Mexico Department of Health (NMDOH)
** 2005 data is provisional

**Recent and Upcoming Prevention and Diagnostic Advancements**

The Food and Drug Administration (FDA) recently licensed two 'booster' tetanus, diphtheria and pertussis vaccines (Tdap):
1) BOOSTRIX®, manufactured by GlaxoSmithKline Biologicals, was licensed for use in adolescents 10 through 18 years of age on May 3, 2005, and
2) ADACEL™, manufactured by Sanofi Pasteur, was licensed for persons 11 through 64 years of age on June 10, 2005.
These are the first pertussis vaccines licensed for use in adolescents and adults in the U.S.

On June 30, 2005, the Center for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) recommended that:
1) Adolescents 11 and 12 years of age should be given Tdap in place of the tetanus-diphtheria (Td) booster currently given to adolescents, and
2) Tdap should be given to adolescents 13 through 18 years of age who missed the 11 to 12 year dose of Td.
3) Encourage adolescents 11 to 18 years of age who have already been vaccinated with Td to receive a dose of Tdap to further protect against pertussis.

On October 26, 2005, ACIP recommended the routine use of a single dose of Tdap for adults 19 – 64 years of age to replace the next booster dose of tetanus and diphtheria toxoids vaccine (Td). They also recommended Tdap for adults who have close contact with infants under 12 months of age. ACIP recently published its recommendations for single dose Tdap and Td use in adolescents 11 – 18 years of age (December 9, 2005) as well as its provisional recommendations for single dose Tdap in adults 19 – 64 years of age (December 15, 2005). After review, official recommendations are published in CDC's Morbidity and Mortality Weekly Report (MMWR) which can be found at www.cdc.gov/mmwr/. On March 24, 2006 the official recommendations were published for "Preventing Tetanus, Diphtheria, and Pertussis Among Adolescents: Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccines" which can be found at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5503a1.htm.

Tdap effectiveness is unknown; however, it is expected to wane over 5-10 years. The Immunization Program of the New Mexico Department of Health (NMDOH) has issued guidelines consistent with those of ACIP for use of Tdap in adolescents in New Mexico and is providing the vaccine for adolescents through its Vaccine for Children's Program (VFC). For more information about vaccination for pertussis, contact the NMDOH Immunization Program at 1-888-231-2367.

The Scientific Laboratory Division (SLD) of NMDOH is currently in the process of validating polymerase chain reaction (PCR) to test for pertussis. You may have recently noticed a new technique for obtaining nasopharyngeal samples using two swabs which is part of the above-mentioned validation process. NMDOH hopes to have PCR available as an epidemiologic tool by the end of the current calendar year. There is currently no commercially available pertussis serology test that has been validated and NMDOH strongly discourages clinicians from using such tests diagnostically. The Centers for Disease Control and Prevention (CDC), in collaboration with select states, will be evaluating the clinical sensitivity, specificity and predictive values of an anti-pertussis toxin IgG (PT-IgG) ELISA test in prospective studies of confirmed pertussis in order to enhance state laboratory capacity to perform such serologic assays.

**Surveillance**

NMDOH performs surveillance (i.e. systematic collection, analysis, interpretation and dissemination of data that is linked to public health practice) for pertussis using the information obtained from healthcare providers and others to perform case investigations in order to prevent transmission of disease. The following surveillance case definitions developed by the Council of State and Territorial Epidemiologists (CSTE) and CDC are used in New Mexico:

*Clinical case definition* – A cough illness lasting at least 2 weeks with one of the following: paroxysms of coughing, inspiratory "whoop," or post-tussive vomiting, and without other apparent cause. In an outbreak situation, clinical case definition may be defined as any cough illness lasting at least 14 days.

*Confirmed* – a case that is culture positive in an acute cough illness of any duration; OR a case that meets the clinical case definition and is confirmed by positive PCR; OR a case that meets the clinical case definition and is epidemiologically linked directly to a case confirmed by either culture or PCR.

*Probable* – meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to a laboratory-confirmed case.
*Suspected* - A clinical syndrome compatible with pertussis and without other cause, such as cough ≥7 days, cough with inspiratory whoop, paroxysmal cough of any duration, cough associated with apnea in an infant, cough in a close contact of a confirmed case not otherwise meeting other case definitions.

**Treatment**
On December 9, 2005, CDC published guidelines entitled "Recommended Antimicrobial Agents for Treatment and Postexposure Prophylaxis of Pertussis" in Morbidity and Mortality Weekly Report (MMWR) which can be found at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm.

General principles sited in their recommendations include use of the macrolide agents erythromycin (14-day course), azithromycin (5-day course) and clarithromycin (7-day course) as preferred agents for treatment of pertussis in persons ≥ 1 month of age with an alternative agent to macrolides of trimethoprim-sulfamethoxazole if needed for those ≥ 2 months of age. For infants < 1 month of age the preferred agent is azithromycin; erythromycin and clarithromycin are not recommended.

For postexposure prophylaxis of close contacts of a person with pertussis, a macrolide can be administered if the persons have no contrindications to its use. A number of factors must be considered prior to the administration of postexposure prophylaxis including: a) infectiousness of the patient; b) intensity of the exposure; c) potential consequences of severe pertussis in the contacts; d) possibilities for secondary exposure from the contact to persons at high risk. Infants < 12 months of age, particularly those infants < 4 months of age, are at risk of severe and sometimes fatal pertussis-related complications. Pregnant women in the third trimester, persons with immunocompromise and persons with some medical conditions (e.g. chronic lung disease, respiratory insufficiency, cystic fibrosis) are also considered at high risk and in need of post-exposure prophylaxis if they have been in close contact with a person with pertussis.

Close contact of a person with pertussis includes: a) face-to-face exposure within 3 feet of a symptomatic person; b) direct contact with respiratory, oral or nasal secretions of a person with pertussis (e.g. during coughing or sneezing of the symptomatic person, while sharing food or eating utensils, while performing certain medical procedures such as bronchoscopy or suctioning, during medical exams of nose, mouth, throat or mouth-to-mouth resuscitation); c) sharing the same confined space in close proximity with a symptomatic person for ≥ 1 hour.

**Recommendations**
1. Vaccinate all children under 7 years of age with the complete series, and adolescents 11-18 and adults 19-64 years of age with Tdap per ACIP recommendations.

2. Promptly diagnose and provide antibiotic treatment of pertussis cases. Anyone with a cough illness lasting two weeks or longer and/or anyone who has unexplained coughing spasms should be evaluated for pertussis.

3. Provide preventive antibiotics for close contacts of pertussis cases. Anyone who has been in close contact with a confirmed or probable case of pertussis should see a healthcare provider or their local public health office.

4. Isolate pertussis cases during the first five days of antibiotic treatment. Anyone starting antibiotics to treat pertussis should stay home and avoid contact with all persons outside of the household for five days after starting appropriate antibiotics.

5. Contact the Epidemiology and Response Division, NMDOH, to report all suspected pertussis cases. Consultation is available 24 hours a day/7 days a week to assist with contact investigations and to answer questions that may arise at (505) 827-0006.

The New Mexico Epidemiology Report

C. Mack Sewell, Dr.P.H., M.S.
State Epidemiologist

Michael G. Landen, M.D., M.P.H.
Assistant State Epidemiologist & Editor

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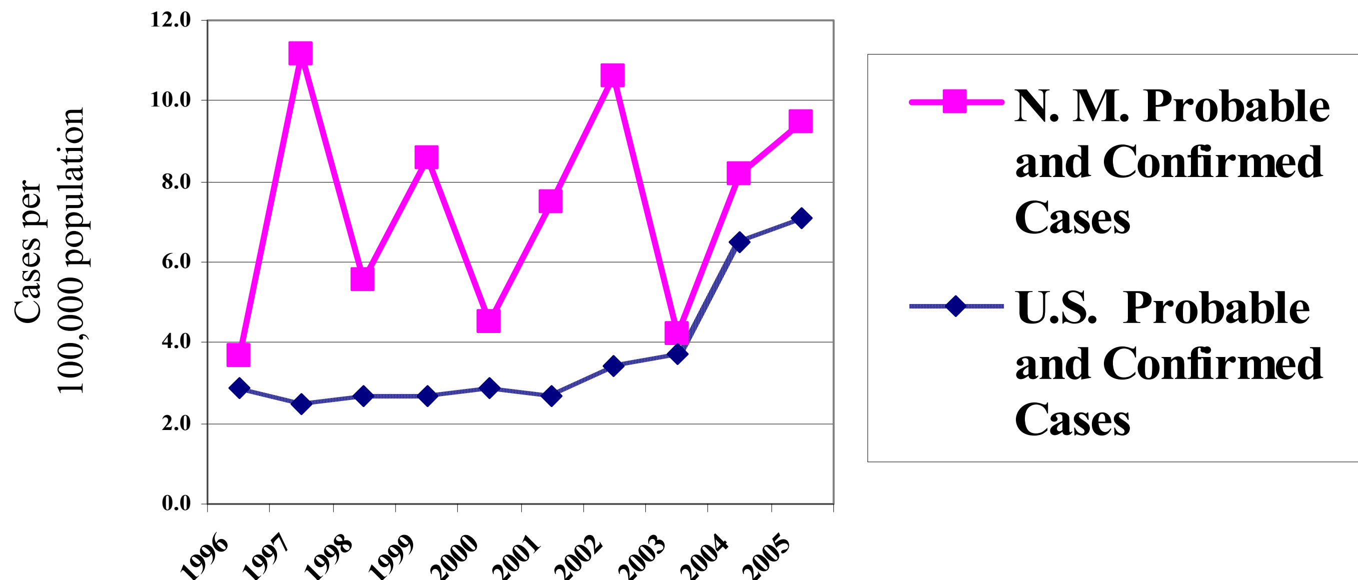
**Figure 1. Pertussis Rates, US and NM, 1996 - 2005***




Source: - National Electronic Telecommunications Systems for Surveillance (NETSS), New Mexico Department of Health (NMDOH)
- Morbidity and Mortality Reports (MMWR), Centers for Disease Control & Prevention (CDC)

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